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Problems of Speech

Joseph M. Wepman

The exceptional child is playing an ever increasing role in our educative and therapeutic plans for the future. This is justifiably so for the extent of the problem of handicapped children is more far-reaching than many realize. Dr. Max Goldstein[1] numbered the defective children in our school systems in 1937 as "40,000 blind; 60,000 deaf; 80,000 partially sighted; 300,000 crippled; 3,000,000 hard of hearing and 4,000,000 with speech defects." This does not include the mentally defective children.

We are concerned in this paper with the largest of these groups, the child with a defect or disorder of speech. By definition we limit the group by calling speech defective when it is unintelligible or confusing, labored in production, too rapid or too slow for the age of the individual or when it is unpleasant in tone or pitch. Speech problems are rarely isolated disorders but not infrequently occur in the presence of such other defects as physical abnormalities or poor social environment or both. Likewise treatment for these problems of speech is rarely an isolated affair, frequently the services of a speech therapist is but an adjunct to surgical repair or psychriatric attention to the family.

We divide speech defects into four main categories: defects of articulation, defects of phonation, defects of symbolization and defects of rhythm.

The first group, the articulatory problems, exist whenever an individual substitutes one sound for another; eliminates or omits sounds entirely; elides sounds by not producing them completely, or malproduces sounds. These errors may be due either to some anatomical or physiological faults, absence or malfunctioning or due to some environmental or phychogenic problem. As an illustration consider the case of J. B., a 19 year old girl.

She was referred by the orthopedic clinic because of indistinct speech. Medical diagnosis: "Hemiplegia of the right side following birth injury." During patient's early life she was constantly under the care of an orthopedist and received physical therapy designed to aid her locomotion and the manipulation of her hands. She had graduated from high school and now wanted to secure employment. On examination it was noted that her speech was intermittently explosive and whispered; her articulation was defective in that she elided the medial sounds and omitted final sounds. All sounds were made normally in isolation. She had had several years of phonic drill in school speech clinics. Her speech at this time was barely intelligible, it was not easy to listen to nor pleasant to hear. There was some loss of hearing in both ears and her tongue and palatal control was not good.

She was given lip, tongue and palate exercises daily for nine months until she had an improved mastery over these organs of speech. Further exercises for speeding the diadochokinetic rate were done at the same time. After this stage of treatment was fairly under way and some definite improvement was noted, ear training was begun so that she could recognize her errors in speech. No phonic work was deemed necessary. Her speech today is not normal, but it is inteliigible and not unpleasant to hear.

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Read before the Chicago Chapter of the American Physiotherapy Association, February 1939.

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G.U.

It is a corollary in therapy for patients suffering from muscular disabilities that speech will improve usually to the same degree that there is improvement in other muscular power. That is to say, an individual who is able to regain normal use of the musculature of locomotion when these muscles as well as the muscles of speech have been affected will also be able to regain full control over the speech musculature. When, however, the improvement in walking is limited, the improvement in speech will be equally limited.

Before leaving the mechanical obstructions to normal speech let us consider another fairly common type of anatomical disorder, one that in almost every instance requires speech reeducation—the congenital cleft of the palate. To illustrate, a boy, C. R., came to the University of Chicago Speech Clinic at the age of sixteen for speech training.

He had had a congenital cleft of the hard and soft palate that had been repaired several times and finally was closed successfully on the sixth trial early in the spring preceding his first visit in July 1937. On examination it was revealed that the soft palate was short and immovable, all speech was nasalized, and many of the oral sounds were omitted because of the lack of air passing through the oral aperture. These included the sounds requiring pressure—p, b, t, d, k and g—and the sounds requiring a steady flow of oralized air, such as the sibilants and the continuant l and r. Speech unless enunciated very slowly was nothing more nor less than a series of nasalized vowels that was in most instances completely unintelligible to the auditor. Instructions as to massage were (in this instance) given to the patient and were to be done daily for two five-minute periods progressing to two ten-minute periods at the progressive rate of one minute daily. The ten-minute massage periods were then to be done daily until advised to the contrary by the clinician. Given supplementary to the massage, but equally important, were light blowing exercises that would likewise stimulate the soft palate. After three months of this procedure, massage was discontinued and heavier blowing exercises were begun. Later as the patient was able to control an airstream that was becoming oralized due to increased movement in the soft palate, drills on sound recognition were instituted. Blowing exercises were continued by the study of a wind instrument. The patient received regular lessons, by a qualified teacher, on the clarinet. This served to assist in the closure of the nasopharyngeal sphincter as well as to stimulate the patient in his rather monotonous, seemingly meaningless exercises. The patient after fourteen months of training has rather good speech with some nasal tone. No lengthy course of treatment on the sounds were necessary, for when the air stream became properly directed and the ear was trained to recognize the sounds, the speech became normal in articulation by self-correction.

The essential point in treating any of these anatomical speech disorders is that phonic drill on individual sounds and mouth positions for the sounds are quite unnecesary. When the patient is capable, physically, of making the adjustments necessary and when his own ear recognizes the errors he will in most instances correct himself. The opposite is likewise true, no amount of phonic drill will avail while the patient is incapable of producing the normal movements.

Articulatory disorders are most frequently due to other causes than anatomical or physiological defects. Poor speech models in the home, perseverance of early speech attempts due to family acceptance, short auditory memory span and poor auditory discrimination account for more so-called dyslalias in early childhood than do all of the physical defects. Usually more than one of these causes is present when a child has defective speech. There are many children who have poor speech models but whose speech is normal because all else is normal. Some other children with poor auditory discrimination and poor speech models persevere with poor speech past the time of entering school and cause themselves considerable social embarrassment. Too frequently the parents of these children are told to leave the problem alone because it will be outgrown without special attention. While this is true in most instances, the difficulty that the child experiences in his early school days because he is not accepted or because he cannot actively participate and compete with other children that talk normally and the personality changes that occur because of this social pressure warrant any parent becoming alarmed and "doing something about it" before the child enters school. Examination and, where indicated, treatment at four and five years of age may save the child and parent needless concern later in life. Some of these psychogenic speech problems are easily visualized in the following case:

C. G. was a well nourished, healthy boy of

eight years, referred by his pediatrician for indistinct speech. The history revealed that he was the only male in a family of seven children and the youngest sibling. His youngest sister was five years older than the patient and his oldest sister was eighteen years older. His family was inordinately fond of him and he was coddled and petted beyond normal limits. Consequently his early speech attempts were considered cute and names that he gave the family and objects in the home that he named in his first infantile attempts at speech were thereafter always referred to by those names by the entire family. The result of this treatment was seen in his general deportment as well as in his speech for he was infantile in everything that he did, although by psychometric examination it was revealed that his intelligence was above normal. Speech analysis revealed that he made all of the usual speech substitutions and had an apparent inability to recognize certain sound differences. The final diagnosis was dyslalia caused by infantile perseverance and poor auditory discrimination. His speech was worked with directly by phonics and by word drill, while the sisters were receptive to the suggestions made about changing their general attitude toward him. After seven months of treatment, once weekly, plus the work that was outlined for him at home under the supervision of one of his sisters, his speech improved to a point where further professional treatment was unnecessary. The patient was seen one year later and it was noted that while his speech was improved considerably, he was just coming out of the infantile condition that had enslaved him for so long.

Too often situations similar to the above are encountered where well meaning but misguided families assist in the continuation of habits which are not socially desirable and while in the case outlined above there was some change that assisted in overcoming the speech problem, in many instances the family resists treatment and the speech is just another facet of the problem that remains, despite extended speech therapy.

The foregoing passages are a brief outline of the first group of speech disorders, the illustrations are individual examples that serve to demonstrate the category but are not meant to be inclusive.

The second group of speech problems are the defects of phonation or voice; the aphonias, complete loss of voice, and the dysphonias, partial loss or malproduction of voice. Since voice is the product of the vibrations of the vocal cords as an air stream passes them, it follows that any physical or psychological phenomena that impedes the free action of the cords will produce a phonatory problem. Likewise, since voice is guided in its production as to pitch, inflection and volume by the ability to hear, it follows that aural defects that are sufficiently severe will upset these factors of vocal production. Since a voice that is normal for the age, size and sex of the speaker is dependent upon the size of the larynx and thereby the length of the vocal cords, any condition that affects growth and normal development in such a way that the larynx is underdeveloped will result in an abnormality of voice.

To illustrate one of these conditions the following case study should be of interest.

L. F. was a 42 year old woman referred to the Ear, Nose and Throat Clinic at the University of Chicago because of hoarseness for two years. Indirect laryngeal examination revealed a growth of polypoid tissue situated on the anterior portion of the vocal cords. A biopsy by direct laryngoscopy revealed the growth to be benign and on consultation with the speech therapist the least drastic procedure was advised. This consisted of complete voice rest for two months. On reexamination the vocal nodules seemed the same and were then removed surgically. Postoperatively the patient was placed on complete voice rest for one month. After this her voice was weak, easily fatigued and tremulent. By the use of a bilateral noise box her full voice was developed and after four clinical visits she was discharged with normal use of the voice in pitch, quality and volume.

The course of these physical vocal problems are usually as responsive to simple therapy as this only if the disorder is not of too long standing and then of course only when the physical problem is eliminated.

The vocal disturbances of the deaf are usually overcome only by the use of a hearing aid when that is possible, and improvement can be shown at times while teaching the mute to speak. Ordinarily, however, vocal problems exist as long as the hearing is seriously affected.

The high pitched voice presented by the undeveloped or feminine sized larynx in sexually undeveloped males usually becomes normal in pitch as growth, stimulated by androgenic substances, increases. At times, suggestion is necessary to begin this vocal change process; the essential voice is produced, how-

ever, as a result of the increased length and size of the vocal cords.

Phonatory problems are frequently the result of psychogenic problems as well as physical. Many of the latter conditions are mimiced while other voice problems are the result of shock, misuse of the larynx or perseverance of childlike voice beyond puberty. The latter type is frequently seen by the speech therapist. Boys that sing in choirs and persevere with high pitched conversational voices, boys whose larynges seem to lag in development as compared with other bodily growth and boys whose larynges seemingly develop overnight while the ear that guides speech maintains the high pitched voice all are problems that are responsive to treatment. Not infrequently, however, the loss of voice due to shock needs the attention of a psychotherapist and not the mechanical suggestion of a speech therapist.

The third group of speech disorders are those wherein speech is completely or partially lost due to trauma of the cerebrum.

No act of the human species is more complicated, defiant of definition or of simplified explanation than the act of speech. Suffice for this paper to say that disturbances on the cortical level of human behavior either in the sensory or motor phase produce speech limitations that are serious in consequence of their debilitating effect upon the individual. Jellife and White[2] very simply outlined the motor speech problem thus: "Aphasia (the technical name for loss of the ability to symbolize) consists of a disturbance or loss of speech resulting from a failure to evoke or control the memory of those auditory or visual symbols used in social interchange of concepts or ideas." In speech both the receptor pathways (i. e., the hearing and seeing of recognized word symbols plus the recall of past word symbols heard, seen, etc.) and the effector pathways (i. e., the motor side wherein motor images, new and old, function) must both be open. The older school of neurologists and the easier understood but less clinically definite group of writers describe the receptive aphasias (word deafness) as disorders wherein the patient can hear but apparently does not understand spoken language; can repeat words but cannot understand the words he has spoken nor use them properly. Patients with motor aphasias, are capable of both hearing and understanding the spoken word but incapable of producing spontaneously anything but a meaningless jargon of sounds. The defects of symbolization are possibly more easily understood by illustration. A patient with motor aphasia seen recently was a boy of 13 years.

At 12 years of age he had an intracranial tumor removed surgically. Subsequently in common with other signs he exhibited a complete motor aphasia. His only language 14 months after the operation consisted of a faltering "yes" and "no." He was able to follow directions, with the limitations of his physical defects. He understood simple language although not as well as he did before his operation. He used gestures to make known his wants when they were not foreseen. He was first taught to imitate certain of the simple sounds without meaning, then to combine those sounds to form simple words with meaning, such as k-a-t for a picture of a cat. All of this in the early stages of treatment was by imitation, until through reiteration it became part of his newly formed memory for sounds. All of the simple sound combinations were reviewed until he was capable of producing them without prompting and by sight recognition alone. More and more simple words were added until his word-vocabulary was equal to that of a child of six years. The patient was then encouraged to put words together, to form sentences, to speed word production, to change single words into sentences, to begin to read orally and to express his wants in sentences. Today the patient can do most of these things and as his physical ability improves, so, too, will his speech improve.

The avenue of approach to the auditory aphasias are less direct and time is the greatest aid to the therapist. Many of these problems are self-correcting, and the speech therapists's main concern is to assist the natural recovery and to attempt to speed the process.

An interesting example of the latter type was a girl of 13 seen some five years ago.

She was referred by a neurologist with a diagnosis of auditory aphasia (word-deafness). She heard, and responded to stimuli in every way except in meaningful speech although a meaningless jargon was constantly used. Word images were developed by repetition of single-word descriptions of objects commonly seen and devised by the patient herself. This process was carried out much in the manner of the old conditioning experi-

ments. The patient was shown a piece of candy and the therapist repeated the one word "candy" several times. Patient was then given the candy never being asked directly to repeat the word. The same technique was used in the acquisition of two other words simultaneously, "milk" and "bread." When these three words had been acquired other words were added in rather rapid succession, using only names but progressing to names and objects not in common use. After six months she began to add words of her own and after eleven months began speaking sentences.

Generally, treatment can be expected to improve these patients. I have known such aphasics, however, to go for as long as six months before uttering their first words. No task requires greater patience nor do very many return a greater reward.

The fourth and last group in this resume of speech problems are the arhythmic speakers, commonly called stammerers or stutterers. This is not the place to discuss the etiology of stammering. The various theories on this phase of the problem are almost as varied as the theories concerning the cause of the common cold. Certain facts are known about this group of patients, however. We know there are always approximately a million stammerers in our population, that the disorder occurs more frequently among male than female; that the number of stammerers is greatest during the early school days of the first and second grades and decreases progressively through the later elementary and high school days; that girls are more likely to overcome the problem voluntarily than do the boys and finally that there is an indication at least that the problem runs in families, whether it can be said to be inherited or not is still problematical.[3, 4] Just as there are an infinite number of theories concerning the cause of stammering so too are there a like number of techniques in therapy. It can only be said that stammering can be treated successfully by a number of approaches. Statistics as to success in treatment in this regard are not known, some therapists claim percentages as high as 90, others claim 40 per cent with the majority in between.

It is my belief at the present that successful treatment for stammering depends more upon the personality of the therapist, his reaction upon the patient, his thoroughness and his sincerity than it does upon the technique he follows. I have come to this opinion by having treated successfully patients who have been to other therapists without success and by failing to treat successfully patients who have later overcome their problem at the hands of these same individuals.

By definition, stammering is a hesitation or a block in the rhythmic flow of the spoken word. It has two types of manifestation, the clonic or repetitive type and the tonic or complete block type. Many stammerers exhibit both types, some are limited to either one or the other. Both are equally difficult to treat. Case histories of stammering are plentiful but are unnecessary to repeat here—everyone has heard or seen a stammerer speak, there is no difficulty in recognizing the problem. I believe that stammerers below the age of twelve are best treated indirectly and that older stammerers are best treated directly. Stammering can be treated at any age, beyond twenty the problem of therapy is more difficult because with maturity our speech patterns are firmly fixed, yet even in late life stammering has been overcome. It is my opinion that stammering is a psychological problem that exhibits itself in an overtension of the speech musculature during a mechanical act and must be treated from both psychological and mechanical approaches. This much we know that whenever or from whomever surcease from the problem is sought must be a recognized source, one that receives the accolade of acceptance by the American Society of Speech Correction and by those members of the medical profession with whom he comes in contact. Unfortunately the very seriousness of the problem has brought into being a great number of thoroughly untrained and incompetent people who do nothing but prey upon the unfortunate speech sufferer.

The field of speech correction is here reviewed. It presents many unknown quantities to the research worker and to the therapist. The needs of the profession are many and the training difficult, but good can be done and needs to be done for these millions suffering from handicaps of speech.

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Risser Treatment of Scoliosis

Theodore H. Vinke, M.D., F.A.C.S.

The Risser treatment of scoliosis has been growing in popularity because of the fact that in selected cases it offers more chance for a successful result than any other type of treatment. The cases to be treated by this method of course must be carefully chosen. They are usually selected from paralytic and idiopathic types of scoliosis. In a large eastern clinic only nineteen per cent of the total number of cases of scoliosis is corrected by this method, and in this clinic perhaps a larger per cent of cases is being treated by means of this procedure than anywhere else in the world. The selection of favorable cases is made by the following criteria. It is considered essential that a spinal curve is gradually becoming more pronounced in a growing child or in cases of body imbalance because of a severe curvature. The cases are carefully studied, measured and x-rayed before deciding upon the treatment.

The x-rays are taken with the patient in both lying and sitting positions. The case usually is followed for a variable period of time to determine whether or not the curve is increasing. Usually exercises are carried out either in a gymnasium or under careful supervision before the corrective casts are employed. The purpose of the exercises is twofold: in one respect it can increase the mobility of the spine particularly if the exercises are accompanied by stretching and manipulation with emphasis on derotation, and the other reason is that if satisfactory correction can be obtained by exercises the operative procedure can be eliminated. Dr. Arthur Steindler is a strong proponent of exercises either as a sole treatment or as a preliminary of the Risser treatment. He feels that if a compensatory curve is developed there is more chance that a fusion will hold and the correction be maintained. After these preliminaries have been accomplished the patient is considered ready for the corrective cast procedure. Of course it is understood that a child should be in a fairly good general condition before this type of treatment is carried out. I will not attempt to describe in detail all the essentials of a good corrective scoliosis cast. However, certain aspects deserve discussion of what may appear a brutal type of treatment. Fortunately this treatment is not nearly as severe as it may seem. The patients usually are quite comfortable in these casts when properly applied. However, they must be observed carefully from day to day in order to detect any pressure sore or other ill effect.

The cast reaches from the head of the patient to the knee on one side and to the hip on the other side, depending upon the direction of the curvature. The cast must be well up on the occiput and down around the neck including the chin. It is made very thick and heavy and is applied over stockinette and felt. It is necessary for the padding to be well placed particularly over bony prominences so as to provide protection against pressure sores. The cast usually is sufficiently hard within three to five days at which time it is cut through on the side of the concavity, directly over the area of greatest curvature. The cut is made transversely reaching from approximately the midpoint on the anterior side to the midpoint posteriorly. On the opposite side a large wedge-shaped window is removed which makes it possible to bend the cast and the spine. A turnbuckle is inserted on the side of the concavity and hinges are applied eccentrically on the anterior and posterior aspects of the cast. After this has been completed, correction of the curvature begins. The turnbuckle is turned gradually each day, and when one begins with a small turnbuckle and it has been turned out as far as it will go, it is replaced by a larger one. Usually three sets of turnbuckles are used. By the time the third turnbuckle has produced its greatest effect, the maximum amount of correction usually is obtained. As this correction goes on, the large wedge-shaped window on the one side of the cast gradually becomes smaller while the oposite side, at the site of the turn-

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Read before the Semi-annual Meeting of the Ohio Chapter of the American Physiotherapy Association, Cincinnati, Ohio, November 11, 1939.

buckle, gradually becomes open. X-rays are taken at intervals to determine the position of the spine and the extent of correction.

This corrective procedure is directed at the primary curve as it has been found that if the primary curve is corrected, the secondary curve automatically becomes increased. However, after the removal of the jacket, the secondary curve is corrected in proportion to the primary curve. This is understood when one realizes that the corrective cast pulls the patient way over to one side, in which position the spine is fused. After the patient stands erect again without the cast, the secondary curve becomes decreased in its extent. Doctor Ferguson has described the criteria which are used in the determination of the primary curve as follows: "(1) In case of three curves the middle one is usually the primary one. (2) The greater curve or the one toward which the trunk is shifted is usually the primary curve. (3) When, in the sitting position, the pelvis is elevated on the side of the convexity of the lumbar curve, if this curve is compensatory, it will tend to straighten, but if primary it will not."

The area to be fused is decided upon after careful study. One must not feel that fusion at the site of curvature is sufficient. It may be in certain cases, but it often is necessary to extend the fusion beyond the extent of the curvature. The object is to fuse an area sufficiently to prevent a recurrence of the curvature and also to prevent the production of a new curve. The way this is decided is based on the levels of the vertebrae. It is desirable that the horizontal plane of the superior aspect of the uppermost fused vertebrae be parallel to a horizontal line through the base of the lowermost fused vertebrae. If this is accomplished then the correction is more likely to be maintained.

The area to be fused is decided upon after the maximum amount of correction has been obtained. Then the portion of the cast which has been wedged is filled in with plaster and the cast is reinforced by means of struts. These struts are made of plaster and basswood. After the cast again becomes thoroughly hardened, a window is removed from the back of the cast directly over the area which is to be fused, through which the operation is done.

The operation itself consists of making an incision over the spinous processes of the vertebrae to be fused. The incision is carefully carried down and the spinous processes and the lamina are exposed up to and including the articulations between the vertebrae. Each articular facet is removed by means of a chisel and curet. The spinous processes and the lamina are shaved down by means of a chisel. Each spinous process is entirely used up in this manner and the chips of bone are carefully placed over the denuded lamina. A bone graft is taken from the tibia and placed over these chips, and then the wound is sutured and closed. After the operation, the window over the operative site is closed in again by means of plaster.

The patient is kept in the original jacket for three months after the operation. The jacket is removed and a new one applied which holds the spine partly corrected. By this time the fusion is able to maintain the correction without being held in the extreme position. This cast is kept on for three months and then a third cast is applied which is also worn for about three months. In some cases it is necessary to hold the patient longer than this.

After this procedure has been completed one loses about ten per cent of the correction that one has obtained at the maximum turnbuckle position.

Conclusions

The Risser type of treatment for scoliosis is used chiefly in paralytic scoliosis. However, it has been used in a large number of idiopathic cases. The body balance is improved after the spine has been corrected, the extent depending, of course, upon the degree of correction obtained. It is obvious that all cases cannot be corrected by this or any other method. However, I believe that this is the most satisfactory method of treating paralytic and a large number of idiopathic types of scoliosis. It must be remembered that this treatment uses definite direct forces to overcome the lateral curvature. In so doing it also corrects the rotation to a certain extent. However, since direct force is not used against the rotation deformity, a variable amount persists in the severe cases.

This procedure, we hope, is not the last word in the treatment of this very resistant and important deformity. Much remains to be desired. The treatment itself is quite severe and hard on the patient. One cannot hope for complete correction, but to date this treatment has been the most successful. We still should try to prevent this deformity and to treat it early.

Scoliosis:

Treatment by Derotation *

Helen S. Foss and Margery L. Wagner

Development of Scoliosis

"The development of scoliosis represents a succession of changes, which, in all but the truly congenital type, are open to observation.

"The primary curve develops by inclination or by translatory shift in the frontal plane and by convex side rotation in the transverse plane. Rotation and lateral deviation cannot be dissociated. They are integral parts of the same process of deformation.

"In the second stage, nature endeavors to maintain the normal relationship between body and pelvis by the formation of the usual lumbar counter curves, which show the same obligatory combination of lateral bend and convex side rotation, except that the lumbar spine is freer to undergo a translatory side shift than the thoracic spine; the latter is anchored into the thoracic cage, and therefore its lateral deviation is more of the inclinatory type.

"In both stages, the normal relationship between the trunk and the pelvis and lower extremities is preserved as a whole, and the trunk rests squarely upon the pelvis."[1]

Doctor Steindler feels that most cases, in their natural course, develop into a state of decompensation—going from compensation to decompensation, and he agrees with Risser that most cases come to a natural halt at the completion of growth—about the twentieth year. Doctor Steindler's compensation treatment for scoliosis is based upon the idea of retracing nature's steps — from decompensation to compensation.

Treatment

Our treatment is concerned with these three factors: (1) The obliquity of the pelvis. It must be corrected, for it signifies a disarrangement of the entire body. (2) Realignment of pelvis and spine. We employ the compensation method to produce the normal relationship between the two; that is, we develop a counter curve. (3) Then the scoliosis involves only the spine. Consequently, we proceed to the correction of the curves by derotation. In other words derotation retraces the development of the rotatory collapse, which is the most important factor in the development of the curve.

Doctor Steindler requires the patient to remain in the hospital for at least a three months' period, and exercises are given twice daily. These consist of active exercises, passive stretching and derotation.

Cases having great pelvic obliquity are treated by traction as well as derotation. This means the patient is in bed with traction and is brought to the gymnasium for derotation only.

Corrective casts are sometimes necessary to acquire the desired compensation.

Derotation is given in the sitting position by means of the Grieve chair, and in the recumbent position by means of Doctor Steindler's table (Fig. 1). On the table, derotation is given for a five minute period the first week; ten minutes are given twice daily the second week, and the third week fifteen minutes. Exercises are continued as long as the patient remains in the hospital for treatment. Whenever possible the parents are given instructions for carrying on derotation exercises at home without the aid of equipment.

Physical Therapy Department, Children's Hospital, University of Iowa, Iowa City, Iowa.

*Outline of treatment of scoliosis carried on at Children's Hospital, Iowa City, Iowa, under the direction of Dr. Arthur Steindler. The authors are indebted to Doctor Steindler for his help in preparing this article.

1. Steindler, Arthur, M. D.: The Compensation-Derotation Treatment of Scoliosis. Paper read before the Annual Meeting of the American Orthopedic Association, Atlantic City, New Jersey, May 5, 1938.

This article accompanied the miniature gymnasium and equipment exhibited at the convention of the American Physiotherapy Association, Denver, Colorado, June 1939.

Fig. 1. Derotation table, designed by Dr. Arthur Steindler, consisting of two sections, either one or both of which can be turned. It also is possible to bend the forward section laterally. The patient lies face downward and is held securely in place by means of straps over the upper back, the hips and the lower legs.

Since the bodies of the vertebra rotate to the side of the convexity, we derotate as follows:

	Derotate	*Fixate*
(1) R. Dors. curve..	Front section R. shoul. down	Back section
(2) L. Lum. curve...	Back section L. hip down	Front section
(3) R. Dors. and a L. Lum.	Front section R. shoul. down Back section L. hip down	
(4) R. total.....	Back section R. hip down.	Front section

Just as soon as patients have been mobilized and can "shift" to a correct position, they are fitted with a brace. Our scoliosis braces now consist of a standard body brace with a head extension and a long leg extension (Fig. 2).

All new cases of scoliosis and all those returning to the clinic are sent to the physical therapy department for reexamination. X-ray of cases under treatment also are taken every four or six weeks and although the check-up given by our department sometimes is referred to as a "skin measurement," we find our record is a fairly accurate means of checking on our patients, for our findings in nearly every case are parallel to those of the x-rays.

Our reexamination consists of:

(1) Measuring the patient's height—standing in a relaxed and then an erect position: This gives us an indication of the extensibility of the spine.

(2) Weighing the patient — standing on two scales at the same time, so that we may determine the way in which the patient carries his body weight. This is figured by the following formula:

W—Total weight (80 lbs.) Left side=50 lbs.
O—Overweight (20 lbs.) Right side=30 lbs.
Y—The heavier side (50 lbs.)
Percentage of overweight, Y—W/2=O
O/W% of overweight

(3) Measuring the scoliosis — the length and width, or deviation of the curve. Spinous processes are marked, starting with the seventh cervical and continuing right on down to the cleft of the gluteal fold. A straight line is then erected between these same two landmarks. The length of the curve is de-

Fig. 2. Doctor Steindler's scoliosis brace consisting of a standard body brace with head and long leg extension.

termined by the intersection points with the straight line. The width of the curve then is measured—measuring from the straight line to the apex of the convexity. The degree of the curve is computed, using the trigonometric theory that "a tangent of an angle is equal to the side opposite, divided by the side adjacent."

(4) Measuring the body deflection or deviation. A plumb-line is the perpendicular used to determine the body deflection or deviation (Fig. 3). If it cuts the trunk in the middle, there is no deviation, but if more of the trunk lies to the left or right of it, measurements are taken and the exact amount of deviation is figured mathematically.

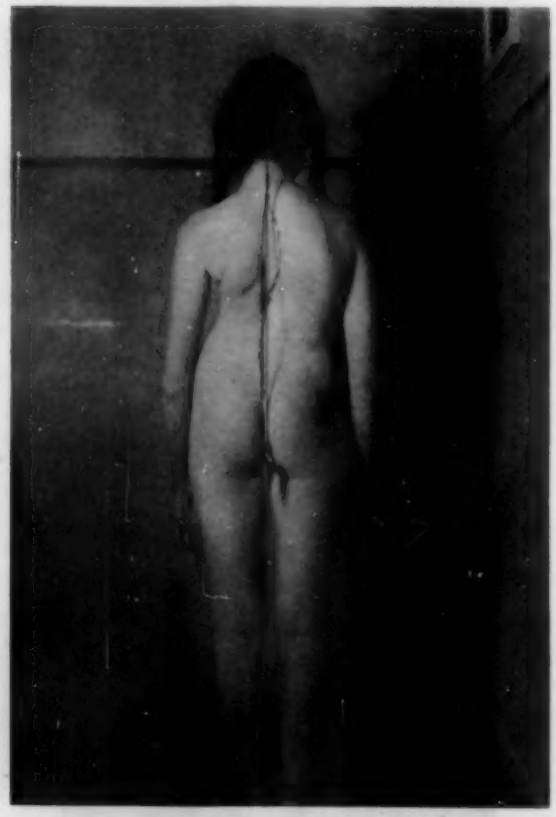

Fig. 3. A plumb-line—the perpendicular used to determine the body deflection or deviation.

CONCLUSION

"Is it possible to straighten the lateral curve by derotation? We believe that it is. It can be shown that derotation of the lumbar spine from the pelvis can be pushed to the point of complete reversal of the rotatory curve and that derotation of the thoracic curve from the shoulder girdle can be obtained, although to a lesser degree and with greater difficulty."[2]

REPORT OF CASES

Case No. 1

Treated by conservative methods—corrected.
Female, age 14 yrs. Habitual scoliosis. Right dorsal curve.
Physical therapy clinical check:

11/1/38—Ht. 5–5 / 5–5¼ Wt. 60 / 60 R. Dors. 11×1=10 No deviation

X-ray reading:
10/25/38—24 degrees—standing
22 degrees—supine
Small difference in standing and supine position shows the small amount of mobility of spine.
11/1/38—Put in head and pelvic traction
Exercises and derotation begun
X-ray reading:
11/21/38—11 degrees—standing
6 degrees—supine
These x-rays show a greater mobility, but the patient is holding correction, due to her exercises.
11/25/38—Discharged with brace and instructions to continue exercises
3/23/39—X-ray reading: 24 degrees—supine
Note: Curve has increased. Failure to maintain correction due to:
(1) Patient admits she removed head extension part of brace.
(2) Patient admits she has not done exercises faithfully.

Case No. 2

Treated by conservative methods—corrected and now holding.
Female, age 15 years. Scoliosis—structural.
Right dorsal and left lumbar.
Physical therapy clinical check:

6/10/38—Ht. 5–1¾ / 5–2 Wt. 55 / 55 R. Dors. 9×1=12° No deviation

11/8/38—Ht. 5–2 / 5–2½ Wt. L-55 / R-50 R. Dors. 7½×⅞=13° L. Lum. 4×⅞=10° 2% over-wt. No deviation

1/26/39—Ht. 5–2½ / 5–2¾ Wt. L-60 / R-45 R. Dors. 5½×⅞=7° L. Lum. 5½×⅞=7° 6% over-wt. No deviation

3/6/39—Ht. 5–2½ / 5–2¾ Wt. L-58 / R-50 R. Dors. 7 ×⅞=10° L. Lum. 5½×½= 9° 3% over-wt. No deviation

Derotation periods:
1. 6/10/38 to 7/2/38
2. 7/18/38 to 1/28/39
Total number of times derotated=251

2. Steindler, A.: Ibid.

X-ray readings:
9/12/38—58 degrees—standing (dorsal spine)
9/27/38—56 degrees—standing (dorsal spine)
11/8/38—58 degrees—standing (dorsal spine)
1/24/39—52 degrees—standing (dorsal spine)
3/ 6/39—60 degrees—standing (dorsal spine)
4/19/39—60 degrees—standing (dorsal spine)

This girl reached early maturity. Some cases come to spontaneous arrest, but our physicians do not believe this one would have, because of the obliquity of her pelvis. She has worn her brace faithfully and has done her exercises regularly. Exercises have been very important here, as good musculature will arrest the case.

Case No. 3

Case corrected and then operated.
Female, age 11 years. Paralytic scoliosis—infantile.
Paralysis, Oct. 1936. Right dorsal-lumbar curve.
Notes from history:
March 1937—Received standard body brace.
March 1938—Derotation and exercises begun.
May 1938—Fusion advised following Risser jacket.
June 1938—Risser jacket applied.
Aug. 1938—Risser jacket removed. Put in traction.
Sept. 1938—Risser cast reapplied.
Physical therapy clinical check:

3/ 2/38—Ht.	4–6¾ / 4–7	Wt.	40 / 40	R. Dors.-Lum. 11×1=10° Dev. 9×½ to r.=3°
8/24/38—Ht.	4–8 / 4–8¼	Wt.	R-40 / L-45	R. Dors.-Lum. 8×1=14° Dev. 12½×¾ to r.=3° 2% over-wt.

Derotation period:
March 1938, to Sept. 1938—rather intermittently.
Total number of times derotated=135.
X-ray readings:
5/ 5/37—26 degrees supine
3/ 2/38—73 degrees supine
1/30/39—31 degrees supine (after first stage fusion)

Operations:
9/29/38—Fusion of dorsal spine
2/ 6/39—Fusion of lumbar spine

This case illustrates the usual course of paralytic curvatures, particularly when back and abdominal muscles are involved. The third x-ray reading shows that we have decreased the curve almost to its original position.

Case No. 4

Case corrected and then operated.
Female, age 14 years. Scoliosis—congenital.
Right dorsal and left lumbar.

Physical therapy clinical check:

2/24/38—Ht.	4–9¾ / 4–10¼	Wt.	45 / 45	R. Dors. 9¼×1¼=15° No deviation
11/8/38—Ht.	4–11¼ / 4–11¼	Wt.	L-45 / R-55	R. Dors. 10×1=11° L. Lum. 5×¾= 9° Dev. 11¾×¾ to r.=5° 5% over-wt.
1/30/39—Ht.	4–11¼ / 4–11¾	Wt.	50 / 50	R. Dors. 9¼×1=12° L. Lum. 5×¼=11° Dev. 9×¼ to r.=2°
3/29/39—Ht.	4–11¼ / 4–11¾	Wt.	L-45 / R-55	R. Dors. 10¼×1¼=14° L. Lum. 5¾×¾=6° No deviation.

Derotation periods:
2/29/38 to 7/2/38 and
8/29/38 to 4/28/39
Total number of times derotated=392
X-ray readings:
3/18/38—40 degrees—standing
6/15/38—46 degrees—standing
1/24/39—74 degrees—standing
4/27/39—50 degrees—supine
Operation:
5/3/39—Fused from 11th dorsal to sacrum.

Our x-rays show that we have given this girl a compensated spine. Her fusion should hold, but if she had been operated on before, the chances are it would not have held.

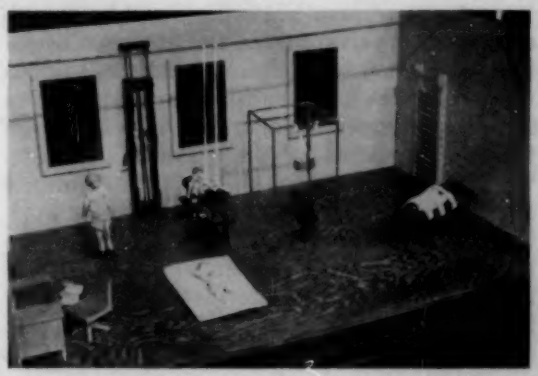

Fig. 4. Model of a gymnasium and equipment.

Case No. 5

Case fused before completely compensated—now broken down.
Female, age 10 years. Congenital scoliosis—spina bifida.
Notes from history:
8/23/29—X-ray shows spina bifida—5th lumbar and 1st and 2nd sacral.
10/ 4/29—Kept on frame. Sent to physical therapy department for massage.

10/12/29—Plaster bed made.
11/ 6/29—Discharged in plaster bed and sent out with instructions for home treatment.
1/20/30—Patient returns—curve much improved.
3/10/30—Fitted with corset—to return in two months.
5/30 —Patient now walking.
7/30 —Corset too small. New corset ordered, to be reinforced with shoulder straps and abdominal support. To return in six months.
2/31 —No change.
9/35 —Patient returns—*after four years.*
9/35 —Risser cast advised—then a fusion.
11/18/35—Operated.
3/36 —Model made for brace.
X-ray readings:
8/18/38—70 degrees
3/22/39—84 degrees (includes one more vertebra)
Present treatment:
4/10/39—Patient put in head and pelvic traction.
4/21/39—Derotation begun—also exercises.
When compensated, she will be fused again.
The first fusion failed because:
(1) Patient was not fully compensated.
(2) Fused area was not long enough.

Physical Therapy and Dermatology

Leon Goldman, M.D.

The problem of skin diseases is very detailed and therefore only a few of the more important and practical aspects will be considered. In his private office the average dermatologist has x-ray, sometimes radium, various forms of ultraviolet lights and various types of electrotherapeutic apparatus, especially high frequency machines and galvanic currents. With this complete set-up it is rare for the dermatologist in private practice to refer work to the accredited physical therapist except perhaps for massage or for certain forms of diathermy. It is unfortunate that the removal of hairs by electrolysis has not been made a part of the physical therapist's knowledge rather than very carelessly allowing it to pass to the nonprofessional groups. However, it is chiefly in hospital services that the physical therapist can help the dermatologist. This is true especially in those private hospitals where the physical equipment of the dermatological department is practically negligible and also in those general hospitals in which the dermatological service is not very extensively equipped. Even with a highly organized dermatological department the trained physical therapist frequently can help this department in the therapy for several types of dermatoses.

Before discussing specific problems in dermatology, I should like to say a few words concerning some dermatological aspects of the general field of physical therapy. We, in dermatology, have a very reasonable fear of multiple pyogenic infections in the skin. When multiple lesions develop, the organisms certainly are virulent for the patient and may be virulent for people who come in contact with them. Even though these pus infections be very simple pimples, not of the acne type, or even though they be extensive boils or carbuncles, they should be handled with great care. If massage is necessary for such patients, the technician's hands must be protected. Never squeeze or wipe the pus off with bare fingers. It is not uncommon for professional hands which frequently come in contact with soap and strong chemicals, to develop little fissures and hangnails and thus provide avenues for infection. Another potential source of infection is the ringworm disease of the feet. It is amazing that so many orthopedic men and physical therapists in their de-

Carew Tower, Cincinnati, Ohio.
Read before the Semi-Annual Meeting of the Ohio Chapter of the American Physiotherapy Association, Cincinnati, Ohio, November 11, 1939.

tailed examinations, without taking any precautions, will handle fungus infected feet. Of course, it is difficult for ringworm of the feet to spread over the body. Yet, because of the close functional relationships of the hands and feet, it is not uncommon to infect the hands. Precautions should be taken when the patient has a ringworm infection and especially a ringworm disease with secondary pyogenic infection. There may be other instances when some of the infectious skin diseases can be transmitted to the physical therapist, but these are much less common. Syphilis infection is possible only rarely because the infectious lesions are chiefly around the genitalia or in the mouth, and occasionally, in obese patients, under the breasts and in the axillae.

At times in dermatology we see a peculiar type of brownish lattice-work discoloration over the legs which we call erythema ab igne and which the old folks say comes from "a-sittin' too close to the fire." We have seen such reactions from repeated applications of the infra-red lamp and wish to caution you that if such reactions do occur to stop treatment immediately. Otherwise, the pigmentation may get too deep and may become cosmetically disfiguring.

Dermatologists are very much interested in the subject of adhesive dermatitis. Apparently much of the irritation seems to come from the presence of certain resins in the adhesive plaster. As you all know, the adhesive should be used very sparingly on sensitive individuals. Occasionally preliminary skin painting with tincture of benzoin will cut down, if not inhibit completely, an adhesive irritation. Adhesive dermatitis should be avoided in the presence of pyogenic skin infection.

Because of close relationship with the patient, the physical therapist can detect early signs of trophic disturbances in the skin. The early recognition of this and the institution of suitable measures, such as protection from pressure and dryness, may do much to prevent the occurrence of swelling, ulceration and other conditions. Therefore, the physical therapist should inform the physician as to the occurrence of early signs of trophic skin disturbances. In certain types of rheumatic infection there are interesting and, at times, significant skin reactions. These may be so transient that the attending physician may not have a chance to see them. If the physical therapist, in her care of such cases, would look for and report any skin eruption, especially of the faint reddish circular type over the trunk, the observation would be very important and very helpful to the physician. This is true because some of these eruptions may be indicative of heart involvement.

Now, to consider a few specific problems. The problem will illustrate the specific and also the general aspects of a physical therapy procedure. One of the important physical therapy agents for the treatment of acne, especially in younger individuals, is ultraviolet light. General body radiation is much better than simple radiation of the affected areas on the face or back or chest. If actual peeling of the skin is desired, then the general radiation must be combined with peeling radiation of the face. If general body radiation is done, the treatment must be less than an erythema dose and must be repeated at least several times a week. There should be no medications on the face during the treatment. It must be remembered that in spite of the popular sales of sun machines in drug stores, ultraviolet radiation is a significant form of treatment and causes definite changes in the skin, especially in the basal cell layer of the skin. If the radiation is too intense, this basal cell layer may be destroyed. Although ultraviolet light is used for a great number of disturbances in general medicine and in dermatology, especially in the latter for eczemas, pyodermias, psoriasis (here it must be combined with coal tar to secure better effects), yet difficulties will arise if the treatment is used for everything. The sensitivity of blonde skin is well known. Unfortunately it is not well known that continued ultraviolet radiation may be dangerous in older people, especially those who develop brown spots and local scaling areas from repeated sunburns. Also there rarely are individuals with congenital sensitivity to light. In spite of some confusion, ultraviolet radiation should not be used in pellagra. The most common mistake is giving ultraviolet light to patients with that skin disease which we call lupus erythematodes. This sometimes may be no more than just faint reddish circular scaling spots about the cheeks or in its chronic form a whitish scarred butterfly-like lesion across the nose and cheeks. Ultraviolet radiation given to a patient with lupus erythematodes, frequently will cause a spread of the lesions and make the patient ill to such a degree that it may prove fatal.

The use of water cooled ultraviolet lamps should be restricted to definite specific instruc-

tions from the physician because the usual treatment is a deep burning of the skin. This is employed most commonly in localized patches of baldness, frequently transient in character and called alopecia areata.

Up to the time of the popularity of sulphanilamide, progress in the development of artificial fever was very great. The initial enthusiasm has given way to the restriction of artificial fever therapy to its proper fields. It must be remembered that a physical therapist should not give general artificial fever unless she has had special training in this particular field. This training is much more important than the type of apparatus which should be used. Moreover, these treatments, because of their seriousness, should be limited to hospital practice. No matter how well trained the physical therapist, a physician must recommend the patient for treatment and must be available during the entire course of the treatment. Although the old fashioned hot bath and hot blankets may be used to raise the body temperature, with modern methods it is possible to get greater ranges of temperature with less disturbance to the skin and even greater comfort to the patient. The two most common modern methods are the use of the cabinet which will circulate heated and moistened air, and the use of currents which will generate heat in body tissues as they pass through. Perhaps the best form of treatment at the present time is to induce the fever with the electric apparatus, since this is more comfortable to the patient, and then to maintain this fever with the use of the hot box. Although we have not seen any very significant difference as regards skin diseases, Bierman believes that the use of the carbon filament lamps in the box will heat the skin more. It is not necessary to go into any greater detail on this particular subject since, as stated above, I believe that special study is necessary. Although you have been accustomed to use local diathermy, which may be used on various types of local skin lesions, yet this fact does not qualify you to give general body fever. In dermatology the question of fever therapy is brought up in relationship to its use in chronic resistant skin diseases. Foremost of these is psoriasis, which is an incurable skin eruption characterized by the appearance of heavy silvery scales usually over the elbows, knees, lower back and scalp. If ordinary methods of treating psoriasis are not successful and the disease is spreading, then fever therapy should be used. High temperature levels are not necessary and a minimum of 4 or 5 treatments must be given before one can tell whether or not it will produce a result. From our work on artificial fever therapy we believe that extensive boils and chronic urticaria also respond to fever therapy. However, this form of treatment may be tried on almost any generalized skin eruption if the patient is in good health and has some degree of heat regulating mechanism. At present sulphanilamide is used very widely in gonorrhea; yet in sulphanilamide resistant cases the addition of fever therapy may help. We have had several good results with fever treatment of the specific skin eruption in gonorrhea—hard, painful, pussy nodules on the hands and feet (keratoderma blenorrh gicum).

An opposite to fever therapy is that experimental refrigeration therapy for the relief of widespread metastases from malignancy. We must remember that this procedure is still in the experimental stage. If a hospital desires to test this therapy it should rightfully belong to the domain of the physical therapist. In this case also the physical therapist must obtain special training before being capable of assuming such responsibility.

Physical therapy procedures should be used more frequently in the group of extensive skin atrophies. Probably the most common example of this uncommon group is scleroderma—a hardening of the skin with pigmentation around the wide scarring and with a characteristic lilac-ring border in the early lesions. The prognosis is not good in the periarticular forms of this disease. Nothing definite is known as to etiology and the generalized forms, or at least the extensive forms, are hopeless. The small localized patches frequently clear up spontaneously. Massage apparently is the oldest form of treatment for this disease and if this procedure is not too painful it should be continued over long periods of time. Newer developments of physical therapy procedure in this field include the use of galvanic currents to introduce medication into the sclerodermatous areas. The two medicines used by this cataphoresis are histamine and acetylcholine. Unless one is schooled in iontophoresis or cataphoresis one must obtain instruction in this form of therapy even though already familiar with other

forms of galvanism. The reason for this is that local reactions and even general reactions may occur with some of the medications used. With scleroderma, especially periarticular, it is important that the solution which is used does not cause a skin burn. It seems that acetylcholine is used more frequently than histamine, that the treatment must be continued over a long period of time and that it must be given more than once a week. We do not believe that any case of extensive scleroderma should be given up as absolutely hopeless until there has been a prolonged trial with cataphoresis over a period of months. Of course, these treatments should be combined with various local measures that are recommended by the physician. Histamine cataphoresis also may be used in alopecia areata and in the treatment of chronic leg ulcers. The use of high frequency currents, such as electrodessication and coagulation, should be left to the physician.

We also should like to indicate the role of the physical therapist in the general field of burns. In the analysis of a severe burn case the first task is to take care of the general condition of the patient and to get this patient over the first few important days, for in these days primary or secondary shock may occur. After a few days one should analyze the patient to determine what possibilities there are for contractures and how these may be treated. It is important to determine this as soon as possible because at this stage the contracture may be prevented entirely or at least may be much less in degree. Burns which are blistery or which are deep, which occur across any flexural surface whatsoever are potentially able to produce contracture. The tendency to contracture is increased if this burn becomes infected secondarily. With the modern local treatment of crusting technique, especially with tannic acid and silver nitrate combination, the area is healed as if in a skin cast and if this of necessity must extend over an elbow or any other movable surface, then before the crust is applied, the desired position should be secured and fixed and any tendency to change this position corrected quickly, if possible. With this technique, actual physical therapy procedures must be deferred at least until the stage when considerable granulation tissue has developed and the healing area is relatively painless. Now it may be too late to correct the deformity but nevertheless the patient should be referred to the physical therapist at this stage for active and passive motion and massage. The burns across the hand, involving the fingers extensively, should be treated with the hand bath. The solution may be a warm diluted aluminum acetate, warm soap water, et cetera. In this bath the hands feel very comfortable, and active and passive motion can be done quite early. One is always surprised at the relatively good result which is obtained with extensive hand burns. Occasionally when the patient's condition warrants, the old fashioned bathtub method of the treatment of extensive burn cases may be used. The patient is put on a ring or stool in the tub of warm, very dilute aluminum acetate, soap water or whatever solution may be used, and if the patient feels comfortable and the general condition remains good, he is kept in this for an hour or so at a time and occasionally in the older burn cases for quite long periods of time. With these hydrotherapy methods, the physical therapist can assume an important role to supervise the exercise of the patient in the bath and also to analyze the results. Even after the patient has had skin-grafts in the later stages, physical therapy procedures may be used to increase the degree of motion and as hypertrophic scarring eventually is obtained, massage and chlorine iontophoresis is reported to have been used. One must not forget that chemical burns later on in their development produce essentially the same local reactions as scalds. In burns from some war gases, especially of mustard gas and lewisite, healing requires long periods of time and contractures may develop.

This, then, is a general review of how the accredited physical therapist can help the dermatologist, in a practical sort of way. It is not simply a resume of what physical therapy aids the dermatologist himself can give. With your special training, you should see the dermatological case, especially the dermatological case in hospital practice. The field with which you deal will be chiefly that of the chronic resistant dermatoses. The therapeutic armamentarium is not exhausted until you have worked with this case for a "suitable" period of time. It will be of tremendous psychic value also to a chronically ill patient to get a new form of treatment and especially from someone who will be cheerful and capable and someone who also will have an understanding of that dermatosis.

The Use of Buerger's Exercises in the Treatment of Diabetic Patients with Peripheral Vascular Disease

Helen L. Kaiser

The use of Buerger's exercises to improve the circulation to the distal portion of the extremities is not a new method in the treatment of peripheral arterial disease, but the very simplicity of the measure probably has caused it to be neglected or at least not given the attention it merits. We are reporting a number of cases of peripheral vascular disease among diabetics in which the sole form of treatment was the use of Buerger's exercises.

We have had no difficulty in obtaining the cooperation of the patients, once they have been convinced of the fact that conscientious adherence to the simple routine bears promise of satisfactory results. In teaching Buerger's exercises to patients it has been our practice to explain carefully what it is we hope to accomplish by the use of these exercises. We discuss with them the importance of foot hygiene, correct type of garters, proper fitting shoes and the avoidance of pressure and trauma to the foot. Printed instruction sheets concerning these factors are given to each patient. In addition each patient is requested to provide himself with a Buerger board.

A Buerger board consists of a board 11 inches wide and 40 inches long, hinged to permit an angle of 45 to 60 degrees. The lower board is fitted with cleats to support the tongue attached to the upper board. The entire device is collapsible and is easily carried about.

In the first position of Buerger's postural exercises the patient lies on his back with his legs resting on the board which is raised to an angle betweeen 45 and 60 degrees (Figure 1). A pillow or blanket is placed on the board and the upper end well covered to avoid pressure from the sharp edge. This position is maintained for from one to three minutes (by the clock) depending upon the minimum time necessary for blanching of the extremity.

Diabetic and Physical Therapy Departments, Mount Sinai Hospital, Cleveland, Ohio.

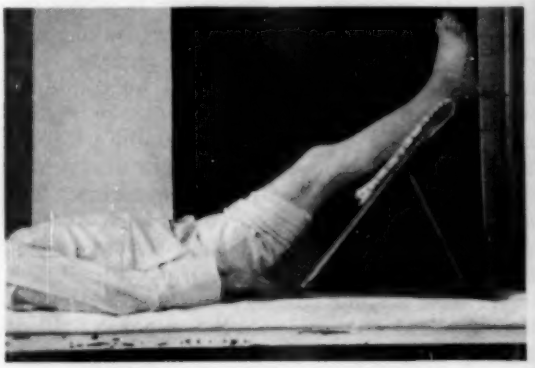

Fig. 1

In the second position the patient sits on the edge of the bed or table with his legs pendant (Figure 2). This position is maintained for one minute longer than is necessary for complete rubor to occur, usually from two to five minutes. While this position is being maintained, it often is advisable to add simple foot movements to prevent the occurrence of pain. Such movements have been described by Allen and consist of one movement each in dorsiflexion, plantar flexion, inversion, eversion, adduction combined with flexion of the toes and abduction combined with extension of the toes. The foot exercises stimulate circulation by the massaging action of the muscles on the blood vessels. Emphasis is placed

Fig. 2

upon the fact that the patient should be cautioned to take a brief rest period after every second foot exercise. Too frequent repetition of these foot exercises may cause an exacerbation of arthritic symptoms.

Fig. 3

In the third position the patient is horizontal, or nearly so, for five minutes (Figure 3). The resting position is usually with the great toe at heart level but it may be necessary to depress this position slightly if an ischemia is present or to elevate it slightly if the veins in the dorsum of the foot do not empty. In any event the optimum resting level should be determined for each patient. It also may be necessary to extend the maintenance of this position for some cases, as older patients may find frequent risings too strenuous. While the patient is in this resting position it is advisable to keep the feet wrapped in a warm blanket. Burns are likely to occur if hot water bottles or bakers are used.

These three positions in the above order constitute a so-called cycle of Buerger's exercises. The duration of a cycle is usually about ten minutes. The patient is instructed to execute three cycles three times daily and, depending upon the severity of his symptoms, told to add a cycle gradually until he is doing a full hour of exercises three times daily. In extreme cases every other waking hour should be spent doing the exercises. We have found, however, that most severe cases improve nicely on a regimen of three to four hours daily. In the milder cases, as little as one hour daily seems to give relief.

Every patient has the exact time determined for each position and a written prescription is given him with exact instructions, including the advice to time his exercises by the clock. It has been found that it requires on the average of three visits before the patient has satisfactorily learned the entire routine. It soon was discovered that asking if the patients were carrying out their exercises at home was not enough but that it was necessary to have a demonstration of what they actually were doing at home. In this way there could be correction of errors and the elimination of additions that the patients themselves thought were valuable improvements to the simple routine which had been prescribed.

The following is a summary of the results in nineteen cases of arteriosclerosis of the lower extremities in diabetics, using Buerger's exercises as the only form of therapy:

One group of fourteen patients complained of intermittent claudication, coldness and numbness of lower extremities. Another group of five patients had, in addition to the above symptoms, ulceration of the toes.

	Cases	Healed	Improved
With ulcers	5	4	1
	Cases	Improved	Unimproved
Without ulcers	14	11	3

Of the group of three patients without ulcers who showed no improvement, two were markedly uncooperative while the third

Fig. 4

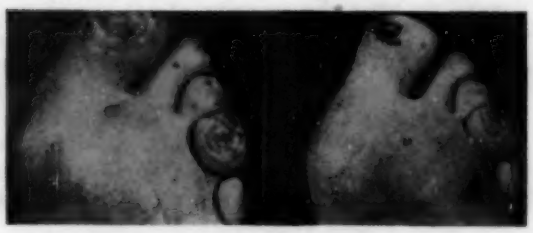

Fig. 5a. *Fig. 5b.*

patient, although quite cooperative, had tertiary syphilis, a factor which may have played a part in preventing results.

One case in the group with ulcers required two and one-half months to heal (Figure 4). This patient was allowed to bear weight during the entire period but wore felt pads to protect the ulcer from pressure. This patient had been under other forms of therapy for four months without any improvement before Buerger's exercises were instituted.

Another case in the group with ulcers was a man 72 years old who had had an amputation of one leg following gangrene several years previously. He developed an ulcer on the great toe and a local area of gangrene on the fourth toe of the remaining foot (Figure 5a). He was put on a regimen of bed rest with four hours of Buerger's exercises daily. After two weeks of this method of therapy the ulcers were almost entirely healed (Figure 5b).

On the basis of our experience we feel that Buerger's exercises, if studiously employed, will be helpful in cases of arteriosclerosis of the lower extremities among diabetic patients. Careful attention to detail in the instruction of the patients should be emphasized.

Fourth World Conference of Workers for Cripples

Mary Potts, R.N.

The Fourth World Conference of Workers for Cripples was held in Bedford College in London, England, the week of July 16 to 22, 1939. The College is situated in Regent Park, with its spacious lawns, beautiful flowers, magnificent trees and a little lake on which were seen swans and boats. The hostess society was the Central Council for the Care of Cripples. Forty-five countries were present in the persons of government representatives and delegates from voluntary societies with a registration of 420, and of these more than a hundred were quartered in the college itself.

One of the chief objectives of the gathering was the adoption of a new constitution and through this to arrange a more effective organization. The name of the association was changed to the International Society for the Welfare of Cripples. This enlarges the scope of the work to include adults as well as children. The purposes were outlined in eight sections covering: organization of national societies; cooperation among them looking towards investigation of causes of crippling and promotion of measures to eliminate these causes; to aid national societies in furthering legislation to promote prevention of crippling, and arranging for physical care, education, and vocational training; to serve as an international bureau for the collection, compilation and dissemination of information relative to the welfare of cripples.

At the Monday afternoon meeting, at which Lord Nuffield presided, a message from Queen Elizabeth, patron of the Congress, was read, wishing us wisdom and success in our deliberations. Welcome was extended by both President King and Lord Nuffield, and many countries responded through their official representatives. The official languages were English, French and German. The interpreter was a Miss Bauman, who was very remarkable. No matter which language was used, or whether it was a prepared paper or extempore discussion, she was immediately on her feet giving the important facts in the other two

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languages. The main address of this meeting was given by the Right Honorable Walter Elliott, Minister of Health. He stressed the importance of a better understanding between the nations of the world and thought that a meeting such as ours might help to accomplish this. He spoke of the close association in Britain between voluntary service and governmental agencies, both local and general. Since 1921 in Britain there have been compulsory educational facilities for the handicapped. He closed by saying, "We speak many tongues, but we all understand one language, the language of fitness, the language of health."

On Tuesday the subject considered was "Preventive Orthopedics in Childhood." Mr. R. C. Elmslie, Chairman of the Executive Committee of the Central Council for the Care of Cripples, was present at all the meetings and gave the first paper. He has practiced for forty years and contrasted the prevalence of rickets, scoliosis and tuberculous conditions when he began his work, with the decreased incidence at present. He ascribed the improvement to public health measures, the Infant Welfare movement leading to a better milk supply, the spread of physical education, better living conditions because of housing achievements and better habits of living, as well as the direct attack by established tuberculosis dispensaries, and the organization in 1898 of the National Tuberculosis Society. He gave a warning note in regard to crippling by accident; unless this is checked, traumatic crippling soon will exceed all other forms.

Dr. George Armstrong of Ottawa, Canada, told of the responsibility placed by law in that country upon the municipality to care for crippled children and the great cooperation given by various service clubs. He spoke of the tuberculosis problem and the necessity for pasteurizing milk. He also described work done in caring for victims of the 1937 epidemic of poliomyelitis. The use of convalescent serum and nasal spray has not proven of as great value as was hoped. In the province of Ontario the poliomyelitis patients were brought into hospitals for three weeks and there taught the nature of the disease and the necessity for prolonged treatment. After returning to their homes they were visited by specially-trained nurses provided by the Department of Health.

Dr. H. E. Hilleboe of Minnesota stressed the social and economic aspects and made the constructive suggestion that uniform standards of nomenclature be set up so that the different countries may compare results and learn from each other.

Dr. Boldizsar Horvath of Budapest said that tuberculosis is the greatest cause of crippling in Hungary, rickets and poliomyelitis not being so prevalent.

Dr. R. Scherb of Switzerland stated there are no special laws relating solely to cripples, but voluntary organizations are so closely coordinated that there is a fairly complete scheme for their care. He stressed the importance of not mixing the intellectually normal with the mentally defective. Australia, where the settlement is sparse and the cities mostly on the coast, has its own peculiar problems; it is sometimes necessary for a child to travel a thousand miles to obtain treatment.

Dr. J. Van Assen of Holland made a plea for the sufferers from cerebral palsy. About 35 per cent are intellectually inferior, but he said that not only from the point of view of the patient's happiness but also because his maintenance is made cheaper and easier, the mentally deficient cripple should be given the greatest care. Every effort should be made to overcome his defect and to develop his intelligence.

On Thursday the subject considered was the education, vocational training and subsequent employment of the crippled child. The first speaker was Dr. Paul Guildal of Copenhagen. One point he made is that voluntary reporting is not sufficient as there are loopholes through which many cripples are lost to sight. Since 1933, Denmark has had a law making it compulsory to notify the central organization of any known case of deformity. He differentiated the care necessary for those who by training may become self-supporting, and those who can never hope to be self-supporting but who should have such training as will give them a purpose and interest in life.

Dr. Cecil Maudsley of the Board of Education, London, spoke of the gradual development of both care and education. There are now fewer special day schools for cripples than in 1919 because through early treatment the number of permanent cripples has decreased. Cardiac cases now approach 50 per cent of the enrollment in the special schools. Teachers are required to take certain courses which are organized each year by the Central Council for the Care of Cripples in conjunction with the Board of Education. He said

that the great advance in recent times makes us believe that the majority of cases, if taken in time, can be so far remedied as to enable children to live practically normal lives.

Mr. Burgum of Columbia University cited the increase in the United States between 1930 and 1936 of more than 300 per cent in special classes for crippled children. The most of this increase occurred in 22 states where state societies were active. He also suggested that education of children necessarily must include the education of parents and community. He thinks today many forget that a crippled child is a normal child in every way except for his physical disability.

In Italy in 1932 a law was passed making obligatory the notification of crippling within two days after birth.

Pastor Vietor of Germany has in his school 250 boys and girls. A three years' course is given and 22 different types of training offered. Before any training is begun, the students are examined to ascertain their aptitudes.

Professor Munnich of Chile explained that they have no central organization because of the topography of the country. It is so long that if it were placed on Europe with the northern point on the North Cape, the southern point would rest in the Soudan, but from east to west it is very narrow. Good physical care is given, however, and the climate almost eliminates rickets.

Friday was devoted to the industrial cripple, with speakers from Latvia, United States of America, Germany and Belgium.

Mr. Maurice Stalk, of the International Labor Office at Geneva, was the first speaker and sketched the growth of workman's compensation laws in different countries. He outlined the gradual progress from lump sum settlement towards a definite effort really to rehabilitate the handicapped and place him back in a self-supporting capacity. Many countries pay maintenance allowance during training. He stressed the need of the development of safety measures, saying as did several others, that the present speed in industrial life constantly increases accident risk.

Dr. Lauterbach of Germany outlined industrial conditions there. The Accident Insurance Bill makes it obligatory to pay a family allowance as well as care for the injured worker during training. All industries employing more than 20 persons are required to employ a certain proportion of handicapped people.

Colonel Strover, who has established Woodlark Camp for the handicapped, urged the need of recreation. As Mrs. Strover said, "They are cared for physically and are trained to work, but few people help them to laugh."

In Latvia medical care is nationalized and is made available to 98 per cent of the people. Some crafts, such as tailoring and shoemaking, are known as trades for invalids and cripples.

Mr. John A. Kratz of Washington, D. C., and Dr. Martin Hayes Bickham of Wilmette, Illinois, both emphasized that care of cripples is a social, educational and economic service that we are under obligation to render and which will succeed through correlation of all agencies, federal, state and voluntary.

Dr. Lindeman of Hanover detailed problems relating to tuberculous patients. Their restricted motor activity makes their problems similar to those of other crippled people.

Thursday evening there was a showing of films dealing with different phases of treatment. Dr. Van Assen showed how the work is carried on in his school for those crippled by cerebral palsy. Dr. H. H. Kessler of Newark, New Jersey, showed remarkable results with prosthetic appliances; for example, a man fitted with an artificial arm who went back to playing a violin. Dr. Zinner showed the work being done in Hungary, and Colonel Strover, by means of pictures, demonstrated the possibility and the value of recreation. There were several other films, one from Palestine, all meeting with an enthusiastic response.

Visits were arranged to many hospitals and schools. Heatherwood at Ascot is one of the open-air hospitals established by the London County Council. Only London children are admitted. Treatment and education are carried on simultaneously. The spinal and hip cases were cared for on Pugh beds. These are really frames which may be placed either on a bed or on a carriage to facilitate moving the patient from place to place. They are so made that bedside care may be given without disturbing the position of the patient. They can be tilted from side to side and the support for the legs may be lowered to allow exercising legs and feet. The children wear very little clothing, were as brown as berries and seemed warm and happy.

John Groom's Crippleage is an interesting place. It was established in 1866. Over 300 girls and women are trained there and then employed in making artificial flowers. There

are dormitories, a small hospital and the workshops. Some of the workers have been there for many years. They are paid trade union wages and pay a small sum for their board. Some live in their own apartments close by. A couple were blind, one deaf and dumb, one with both arms amputated below the elbows. The last named was stippling leaves by means of small rods held in the clefts of the muscles, thus even with so serious a handicap, she found herself useful.

Saturday was spent in an all-day visit to the Heritage Craft Schools at Chailey in Sussex. After a beautiful drive by coach over the North and South Downs we reached the schools. There are two—one for boys and one for girls. Each has a hospital in connection, and workshops.

We were first taken to the Boys' School and were interested to learn that the medical director is Commander Murray Levick, retired, who was with Scott at the South Pole. Some of the bed patients were working in silver, making spoons, tea-sets, brackets, et cetera, all beautifully finished. In the workshops they were making leather goods of various kinds and woodwork in different forms. Only one-armed boys are allowed to use the lathes. Their work has been entered in contests with work done by boys with both arms and has been awarded the prize.

After lunch, tastefully served in the Assembly Hall, we were taken to the Girls' School which is very similar and at which appropriate trades are taught. One money raising device is the Golden Book. Each page is worth ten pounds, and if you wish your name to adorn a page in solitary splendour, that is permissible, or you may share a page with others, depending upon your contribution.

The founder of the school is a Mrs. Kimmins who began the work about thirty years ago and has seen it gradually develop into the splendid institution it is today. King George the Fifth made her a Commander of the British Empire.

We also had an all-day excursion to Oxford. It was primarily to visit the Wingfield-Morris Hospital founded by Lord Nuffield. The chief surgeon is Mr. Girdlestone, one of the outstanding orthopedists of Britain. It is an open-air hospital for both adults and children and is, of course, up-to-date in all its equipment.

Luncheon was served in the great hall of Christ Church College, built by Cardinal Wolsey in the sixteenth century. After his fall, Henry VIII completed the college. The dean of the College, Dean Lowe, from Toronto, Canada, told us briefly of the history of the university, reaching back hundreds of years. Since the days of King Alfred, Oxford has been a center of religious thought and education. The portraits of distinguished alumni on the walls were most interesting, as one noted names famous in British history. After lunch we broke up into small groups, each with a guide, and were shown the different colleges and noted spots of Oxford, ending with the Bodleian Library where some of the plans were found that enabled Rockefeller to restore Williamsburg. After tea at Worcester College, where an archery contest was in progress, we returned to London by a different route through beautiful rural England.

Other social events were also outstanding. A government reception was held on Monday evening at Lancaster House at which the guests were received by the Right Honorable Walter and Mrs. Elliott, and the evening was spent in listening to music by a military band and in looking at the many historical treasures housed there. It is rather a drab building as one views it from the street, but at the rear is a lovely veranda facing a beautiful lawn with fountain and flowers. Refreshments were served here.

The delegates were also invited to a garden party on Thursday afternoon at Buckingham Palace. It rained most of the morning, but we were hopeful that it would clear. Many went early and were repaid for so doing, because the rain did not cease and not long after we arrived the doleful news was spread that the garden party had been cancelled. However, we fortunate ones enjoyed the velvety lawn, the magnificent trees and lovely flowers. The tables were beautifully decorated with gorgeous bouquets and laden with good things to eat. We were rewarded, too, by the King and Queen coming to the balcony to greet us.

The Conference dinner was held at the Holborn Restaurant on Friday evening. At this time, President King paid tribute to the many who had worked so indefatigably to make the Conference a success, paying special tribute to Lord Clifden as finance chairman, to Miss I. M. Nangle, president, and Miss Nora Hill, secretary of the Central Council for Care of Cripples, through whose efforts the Conference had been organized and so successfully carried to completion.

Indications for Physical Therapy in the Treatment of Fractures

Harrison L. McLaughlin, M.D.

Not being a physical therapist, I profess no deep knowledge or understanding of the intricacies of this important branch of medicine. However, as a clinician who treats fractures, and in common with the other members of the Fracture Service, I have some very definite ideas about the role which physical therapy should play in the treatment of fractures and also about the benefit or harm which may result from its proper or improper application.

In any condition which a physician is called upon to treat, his problem is not only to get the patient in a better condition but to do it as quickly as possible and as completely as possible. Recovery following an appendectomy depends upon automatic mechanisms working within the body of the patient and is independent of any conscious effort on his part. The important factors in the recovery of a fracture patient, however, are not quite so simple. We may reduce the fracture perfectly and hold it reduced until the bone is healed, but unfortunately the condition of a fracture patient is not necessarily measured by the condition of the bone. From the patient's point of view, assuming that the fracture has healed, recovery is measured by the strength and suppleness of the part. The speed and completeness with which the two latter attributes are obtained depend upon no automatic mechanism but vary directly as the speed and completeness with which our treatment makes it possible for the patient to commence using and moving the injured member, and with the amount of his cooperation in obtaining active motion and use of the part.

Dr. Clay Ray Murray has described an ideal for the treatment of any fracture. It is to "wish" the fragments back into position without doing any more damage than is already present, to produce a complete and immediate abolition of all the swelling and hemorrhage in the soft tissues, and to continue with the normal function of the part during the time that the bone is healing. Although some of these details are impossible to carry out, the best treatment for any fracture is that treatment which most nearly fulfils the requirements of this hypothetical program.

Let us consider how physical therapy may be an asset in fracture treatment according to this plan. There are certain things which we know physical therapy in its various forms to be capable of doing, if correctly and intelligently applied.

(1) It relaxes muscle spasm. You may wonder how muscle relaxation can help a fracture patient. By relaxing spasm, it follows that pain, soreness and stiffness, the most important hindrances to active motion, are eliminated from the part.

(2) It relaxes neurovascular spasm. In so doing it greatly improves the blood and lymphatic circulation, assists in eliminating the soft part pathology and aids in the physical process of fracture repair.

(3) It can be used to cause muscular contraction, and so gives us both an aid to and a substitute for actual voluntary function of the muscle of an injured part.

(4) It increases the local metabolic rate and so aids fracture healing.

(5) It can be used in the production of an alternating pumping effect on the extremity as a whole and stimulates the circulation of blood and lymph in this manner.

I believe that these five functions constitute the entire usefulness of physical therapy in the field of fracture treatment. It is also my belief that all the various forms of physical therapy which are of use in fracture treatment can be condensed into four basic modalities:

(1) Heat—by means of which we can produce neurovascular relaxation and a certain amount of muscular relaxation. This helps to minimize pathological changes in the tissues

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and is of great aid in eliminating the pathological state once it has been established. As long as the heat applied is of appropriate intensity, and this will be discussed later, it is of secondary importance whether it is wet, dry or produced by some electrical machine.

(2) Massage—by means of which we can produce muscle relaxation so long as it is sedative in nature. It is of secondary importance whether it be applied by hand or by electrical spark.

(3) Electrical stimulation of muscle, and active exercise—by means of which we can produce two results. In the early stages of a fracture lesion, we may exert by contraction of muscle an actual mechanical massage of the innumerable small blood and lymph vessels which are so important from the standpoint of fracture healing and elimination of pathological tissue accumulations. At any stage of treatment, muscle function, whether active or produced by an electrical current, will minimize subsequent stiffness and atrophy.

(4) The pressure-suction boot is valuable in certain situations as an aid in eliminating pathological processes when for some reason the simpler methods are not feasible.

At this point, I would like to emphasize a very important factor in fracture physical therapy. Any of the modalities mentioned above are acknowledged as invaluable assets in fracture treatment but are such only if they are properly and intelligently applied. It is just as equally true that any one of these treatments is a decided liability and may actually prolong the convalescence of a fracture case if improperly applied. This is not a theory, but a proven fact; one which I, in common with every other fracture clinician, have learned to my dismay only too frequently.

As an illustration, the only function of heat is to produce muscular and neurovascular relaxation. If it is applied too intensely it produces no relaxation but rather a sensation of discomfort, thereby accentuating and aggravating the preexisting spasm. Particularly in the form of deep diathermy, intense heat is definitely harmful. A gentle heat of low intensity, over a relatively long period of time, is the only proper way to apply this modality to a fracture lesion.

Consider massage: The muscular relaxation resulting from massage comes only from the sedative effects produced by gentle and rhythmic friction. Its use up to the point of producing pain or discomfort results in muscle spasm—exactly what the massage is intended to eliminate from the part. The only massage indicated in a fracture is the gentle, stroking, "cat's-paw" type, and anything more strenuous is contraindicated, both in theory and by common sense.

Muscle stimulation is a substitute for active contraction of a muscle and should not be given to produce the small minimal contractions which you would want in a case of nerve palsy. It should attempt to duplicate the normal healthy contraction of the involved muscle, but if contractions are made so strong that pain, discomfort or fatigue occurs, more harm than good is being done. Voluntary active exercise also should be kept within the limits of pain and fatigue.

Even a measure as simple as elevation, which is not physical therapy in the true sense of the word, can be overdone. Extreme elevation certainly will assist in draining pathology from a part but may impede the blood supply to such an extent that your best intentions are defeated.

A great many fracture clinicians have almost completely discarded the use of physical therapy in their treatment of fractures. The reason for this is not related to physical therapy *per se* and is no reflection on its intrinsic value but is due to the fact that the treatments to which their patients have been exposed have been improperly or unintelligently applied. Clinician, physical therapist and technician all can do something to remedy this state of affairs, and the first important thing to be done is to educate ourselves not only in the rationale of physical therapy action in fracture lesions but also in the proper application of the various treatments so that they will have the desired results rather than prove harmful and disadvantageous. When this education has been completed we will no longer have to combat the overenthusiastic and improper application of otherwise valuable measures which is the natural result of the viewpoint that the physical therapy is doing something to cure the patient of his troubles, and therefore the more that is applied and the more intensely it is applied, the better. Physical therapy does aid nature in eliminating pathology and in alleviating symptoms, and it does make it easier for the patient to help himself, but its use never cured any fracture patient of any organic lesion except by means of the various actions outlined above.

Generally speaking, fracture treatment may

be divided into three main stages. The first is the emergency or prereduction stage of treatment. Physical therapy is very seldom used in this stage, in spite of the fact that it very definitely is indicated. One must realize that a fracture is more than a broken bone, and that periosteum, muscles, fascia and other surrounding soft tissues are torn and bleeding. The result is a hematoma of gradually increasing intensity and area. Within a short time a local inflammatory reaction occurs, all soft tissues become infiltrated with blood and inflammatory exudate, and the muscles in the area become spastic. This condition is a perfect set-up for the use of physical therapy, except for one thing. That is the presence of relatively uncontrolled broken bone fragments, and this factor tends to limit the number and types of modalities which can be used with safety. However, a fracture in this stage always should be elevated as well as immobilized, and a little gentle heat of any kind will not only make the patient feel more comfortable but will relax the neurovascular and muscular spasm at the earliest possible moment. Sedative massage of the type described by Mennell as "cat's-paw" is very beneficial for its sedative and almost anesthetic local action. The use of these three measures in addition to early splinting and general care of the patient makes an excellent routine for the prereduction management of any fracture case.

The next stage is that period elapsing between the time of reduction and the time of healing of the fracture, and here the part frequently is protected, restricted or immobilized in some form of apparatus which appears to mitigate against the application of physical therapy. This is the period during which physical therapy is most useful, but unfortunately it often turns out to be the period in which it is not used. The explanation of this lamentable fact lies in a general failure to think out and understand even the simplest of the various processes occurring in the region of the fracture.

It must be remembered that a fracture lesion is more than a broken bone; that the broken bone often is the least important pathological factor present, and that the muscles, nerves and blood vessels always are injured to a greater or lesser degree depending upon the location and displacement of the fracture fragments. It also must be borne in mind that until the broken bone is reduced and held in place, the soft parts continue to suffer a continual succession of fresh injuries in any fracture where the fragments are displaced and moving about. Let us presume that the bleeding at a fracture reaches a maximum between four and eight hours after the accident. From this time onward there is a gradual metamorphasis of the hematoma into callus at the fracture site and into scar tissue in the surrounding area. The original lake of bloody fluid becomes an organized clot. The muscles and other soft tissues become impregnated with inflammatory exudate and cells, following which they change from soft and elastic structures to hard, brittle and inelastic ones.

The uninterrupted course of this reaction to injury leads to a stiffening of the muscles and joints due to adherent scar tissue in and around all the soft parts of the area. This markedly impedes the blood and lymphatic circulation, and this impediment has a direct bearing on the actual healing rate of the fracture. Bone atrophy and muscle atrophy of disuse follow very shortly. The former often is characterized by severe and persistent pain, which, in conjunction with the muscle weakness, constitutes a barrier to the eventual limbering up of the part that the patient can overcome only by weeks or months of painful effort and that he sometimes never can surmount. None of this is necessary. Under normal circumstances, excluding children, the amount of residual stiffness and pain and the difficulty which the patient will experience in eliminating these symptoms decrease in direct proportion to the speed and efficiency of the measures taken to interrupt or minimize the sequence of events which have been mentioned. Also, the most efficient measures available lie in the field of physical therapy.

Both the hematoma surrounding a fracture and the exudate into the substance of the soft tissues can be eliminated by the early and proper use of physical therapy. The fact that the injured limb frequently is inaccessible due to the presence of a plaster cast or splint may appear to eliminate physical therapy as a treatment, but actually the presence of a plaster simply makes its application a little more difficult. No matter how securely a limb may be tied up, there always are ways of applying some form of physical therapy with beneficial results.

(1) Elevation of the part almost always is possible.

(2) Education in active contraction of infiltrated muscles inside the plaster with a

view to the beneficial pumping effect and the prevention of disuse atrophy always is possible and should be insisted upon in every case.

(3) If active contraction of a muscle is for some reason impossible, electrical stimulation may be employed, through a hole in the cast, if necessary.

(4) Splints may be unbandaged or lifted for the application of heat or sedative massage. However, under these circumstances, although the early application of physical therapy is of great importance, the early removal of splints carries with it a real risk of allowing the reduced fragments to slip. Therefore, to carry out these measures safely, not only the physician but also the technician must be thoroughly trained in this particular line, and the latter, in order adequately to carry out this stage of fracture treatment, must be just as much a specialist as the fracture surgeon responsible for the case. Inexperienced or careless handling of a fracture may do inestimable harm while the physical therapy does a little good; but careful, trained handling will do no harm during the time that physical therapy is performing its important duty to the injured part.

(5) Frequently fractures can be handled by methods in which no plaster is used. These cases are much more easily given their treatments and invariably respond more quickly and satisfactorily.

(6) Many fracture cases are immediately operated upon in this hospital on the basis that this treatment approaches the ideal. Let us consider the advantages of this method from the viewpoint of the tissues alone. The fracture is accurately reduced and fixed in place by a rigid internal splint. This allows immediate and unrestricted contraction of all muscles and, with the aid of balanced suspension, full movement of all joints. Much of the hematoma and exudate escapes from the area during operation, while still in a liquid or semiliquid state. The postoperative enforcement of free, full and active motion of the whole part minimizes the subsequent need for physical therapy, but the absence of any postoperative restricting apparatus makes for easy application of physical therapy when it is required.

Physical therapy in the form of heat, massage and muscle contraction is not only a help but is an invaluable part of the treatment of a fracture from the moment it is reduced. Early and adequate treatment along these lines will not only speed up the recovery of a case but will minimize the number of late problems which the physical therapist is so often called upon to cope with long after the fracture itself has healed.

The third period is that of rehabilitation following the healing of the fracture and the removal of splints. It is during this period that physical therapy is most universally used and, as a treatment, so frequently abused. Remember that your treatment, regardless of its type or intensity, is not going to melt away any scar tissue, *per se*. On the other hand, it has two valuable uses in this stage of fracture treatment. Any one of the elementary forms applied before exercise makes the task of limbering up the part, and thus eliminating the results of the late pathological change, easier for the patient to perform. In addition, the pain and soreness occurring after exercise may be materially lessened by the application of gentle heat and sedative massage. The all-important factor, however, is the active and voluntary use and exercise of the stiffened member by the patient, and the all-important role of the technician and physical therapist is primarily to educate the patient towards this end, both mentally and physically. The fact that they have it in their power to make it easier for the patient to do his exercises and to relieve the soreness coming after exercise is of secondary importance.

Unfortunately this is not always accepted as the working basis in treating a late case, and when it is not accepted, the result is also unfortunate. You all have seen cases which came to your department day after day, enjoying the pleasant sensations produced by their treatments, waiting for the treatments to make them better and doing little or nothing in the way of exercise between treatments. I think you all will agree that this group of patients recovered, if at all, at a much slower rate than did another group who came and had their treatments, enjoyed them equally as much, accepted the benefit derived from them, but who realized that the main part of the job was up to no one but themselves and cooperated with frequent use and exercise between treatments. This error in viewpoint constitutes another reason for the unjust discarding of physical therapy in fracture treatment by some surgeons. The most important factor in the correction of this viewpoint lies in educating not only the

physicians but also the technicians so that they come to realize that physical therapy is not a cure but rather is a means of making it possible or easier for the patient to cure himself. Then, if we can train the patient to the idea that physical therapy is to help him rather than to cure him, we really will have accomplished something, not only for the benefit of the patient but also for the reputation of physical therapy in the field of fracture treatment.

Passive motion in the late stages of a case frequently does as much harm as it does good. Scar tissue may be torn but not stretched by this maneuver, and a weak fibrosed muscle certainly derives no benefit from being wrenched to and fro. The tearing of scar tissue and adhesions increases motion immediately, it is true, but it is equivalent to an additional injury and unless the patient is able to keep the freshly injured parts constantly on the move (and this usually is difficult or impossible due to pain following the manipulation) the eventual result often is more, rather than less, limitation of motion. When passive motion is imperative, it is best done gently and under an anesthetic. A fracture which has been adequately treated from the start never should require passive manipulation.

Although much has been said about the harmful ways in which physical therapy can be applied, there is no doubt as to its value. I have tried to restrict myself to facts which are illustrated by daily examples and hope that my points are clear because, above all, it is not my intention to belittle the real value of properly applied physical therapy in the field of fracture treatment. All the members of the Presbyterian Hospital Fracture Service realize this value, but in the treatment of some 3,000 injured patients annually we have come to some very definite conclusions about the proper and improper application of these measures.

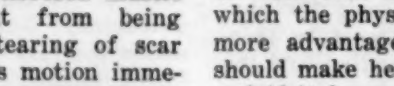
One more point is important. The methods which we are using at present are those which, in our experience, have proven safest and have given the best results. However, many times the technician working on a case has an idea that some method other than that which the physician has requested would be more advantageous. The physical therapist should make her suggestion to the physician, and if it is reasonable and safe, no doubt he will give it a trial.

Let me repeat the three ways in which physical therapy helps to treat a fracture:

(1) It relaxes muscle spasm.

(2) It relaxes neurovascular spasm.

(3) It replaces or augments voluntary muscle contraction. All three are extremely important to us, regardless of how they are accomplished. There is one rule which we never break in any phase of fracture treatment, and which I would like to leave with you. "Any treatment which produces pain in a fracture is harmful. Anything which makes the patient feel better is beneficial." This holds true particularly in the application of physical therapy in any form and should never under any circumstances be broken.



One of the chief sources of disorder at the baths was the time-honored practice of mixed bathing in the nude. So early as 1449 it had moved Bishop Bekynton to issue "A strict injunction and order to the archdeacon of Bath and his official, and all the rectors, vicars and chaplains of the city and archdeaconry of Bath . . . on a report which has reached the ears of the Bishop that the heavenly figt of warm and healing waters with which the city of Bath has been endowed from of old is turned into an abuse by the shamelessness and uncleanness of the people of that city, insomuch that, when any persons, whether male or female, go to the said waters to bathe and recover their health, and through modesty and shame try to cover their privy parts, the men with drawers and the women with smocks, they, the said people, by what they say is an established custom of the city, barbarously and shamelessly strip them of the said garments and reveal them to the gaze of the bystanders, and inflict on them not only the loss of their garments but a heavy monetary fine . . . during mass on Sundays, solemn days and feast days to admonish all the citizens of Bath, and all others staying there, that they abstain from such excesses under penalty of the greater excommunication, and to enjoin on them, under a like penalty, that henceforth no males or females who have reached puberty go to the baths without wearing such drawers and smocks or other linen garments."—*From "The Baths of Bath" by P. Rowland James.*

Massage:

Round Table and Demonstration

The meeting convened at 10:45 o'clock a. m., Hazel E. Furscott, San Francisco, California, presiding.

Chairman Furscott: Walter Johnson, in his "History of Massage," written in 1866, in one sentence gave the whole history and definition of massage. He said: "Massage. The anatriptic art. The art was termed anatripsis by Hippocrates, tripsis by Galen, fricto by Celcus, manipulation by Beveridge, and medical rubbing in ordinary language."

Doctor Gaenslen, in 1936, in his president's address to the annual meeting of the American Orthopedic Association, said, "Massage as a therapeutic is universally accepted and widely employed."

In our observations all of us have seen massage and massage. We have planned a round table today to bring before you the necessity for a technic, based on scientific findings, to see if we can get together and come to some conclusions which will take massage out of the rubbing category and make it the really valuable adjunct to medicine that it truly is.

Our plan for today is, first, to have a technician give a demonstration. Miss Goldie Rosman has kindly consented to do this with Miss Gertrude Beard, of Northwestern University Medical School as commentator. Miss Beard will emphasize especially the scientific aspects and tell of recent research that has been done in massage. Questions which we hope will stimulate general discussion have been assigned to Miss Baum from Fitzsimmons Hospital, Denver, Miss Elson from Northwestern University Medical School and Miss Anderson from Stanford University. Will Miss Beard and Miss Rosman please proceed?

Miss Beard: As Miss Rosman demonstrates I will comment on the points which I believe are essential to good technic of massage.

First, we are going to consider the question from the standpoint of our technic of massage, then consider the technic for a few special types of massage. Before this group it is not necessary to demonstrate the different types of massage technic. We wish to emphasize some practical points which have a definite physiological basis. With the exception of the research that was carried on many years ago, little has been done until quite recently to study the physiological effects of massage. Unfortunately the reports of these experiments have failed to state the type of massage which was used.

What physiological effects and what reactions do we get from the different types of massage? In our practice of massage and from our clinical results we all believe that gentle massage and deep massage may have and certainly do have different effects. What is the difference between the physiological effect of stroking massage as compared to kneading massage? Here is a huge field of opportunity for research, which I think we, as physical therapy technicians, should begin to develop for our own profession and in which little has been done.

First of all, I would like to point out the importance of position. The patient is recumbent. From the physiological standpoint this is important in the technic of massage. I believe that in massage to any part of the body the patient should be recumbent, with the exception perhaps of massage to a hand when the muscles of the forearm and arm have no involvement of circulation. When the patient is recumbent it is possible to obtain relaxation of the muscles as well as to take advantage of gravity as an aid to circulation.

The position of the technician is important. Miss Rosman will demonstrate to you her standing position. This is a comfortable one for the physical therapist and permits her entire body to be relaxed—her hands relaxed so that they fit the contour of the part to be massaged. By bending her knees and ankles, it is possible for her to get a long sweep with her arms without much movement at the elbows and prevents the need of bending her back. This is important from the standpoint

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Round table discussion held at Eighteenth Annual Convention of the American Physiotherapy Association, Denver, Colorado, June 1939.

of relaxation for the technician and the prevention of fatigue.

The next important thing is that of rhythm. From a physiological standpoint, we have little knowledge of the effect of rhythmical massage; it is only from a clinical standpoint that we can demonstrate that it is possible to obtain better relaxation of the muscles when perfect rhythm is used as compared to an irregular rhythm in the application of massage. This can be demonstrated by the relaxation obtained and by the actual comfort which the patient feels.

In the demonstration of rhythm, I would like to emphasize that the rate of speed when the hand is in contact with the body is the same as when out of contact in the return movement. There is no pause in the movement; it is continuous as if making a circle. A patient once said it was like a motor which was set at a certain rate of speed and that the rhythm was carried on just as regularly as the revolution of a motor.

In order to have perfect rhythm, it is necessary that the movement should be slow. Irregular rhythm will result from too rapid movement. There is no advantage in a rapid movement if we are affecting the return of venous circulation. The movement of the blood in the veins is slow. There is no necessity for emptying the veins before there is an opportunity for blood to be brought into them. Mennell has specified that the rate of movement for the stroking of an entire extremity of average length should be ten or twelve complete strokes per minute. I believe that this rate of movement should be carried through all massage movements, using this as a guide. When the rate of movement has been established it will be carried out in the shorter strokes in proportion to the area.

The next thing of importance is that of contact and pressure. We know very definitely that there is a certain stimulus from any contact with the skin. Undoubtedly the reflex effect of massage is due to this stimulus. The mechanical effect from massage is easily explained but there is also an effect that can be obtained entirely separate from any mechanical effects. There also may be a reflex effect from a mechanical stimulation. Recently there has been some research to determine the reason for this reflex effect. It is believed the effect is produced through the vasomotor system. It is suggested that probably this is due to a stimulation of the skin and the formation of a histamine-like substance, which in reaction will produce dilatation of the capillaries and an increased blood flow, even to the extent of a wheal formation. It has not been determined whether that is true, but it is interesting to note from actual experimental work and investigation that there is a complex effect from massage, which can be demonstrated clinically by obtaining relaxation and also by its effect upon the circulation.

The mechanical effect which we obtain from massage is directly upon the venous circulation of the blood and upon the flow of the lymph.

In order to attain the greatest effects from massage of muscles, it is necessary that the muscles be relaxed. This is important because we know that contraction of the muscles will restrict the lumen of the blood vessels, and thereby defeat that which we are trying to accomplish—an increased venous return. From that standpoint the position of the patient which we have mentioned is important.

If necessary, some type of massage which will produce relaxation of the muscles can be used as a preliminary to the massage which we give for a mechanical effect to influence the venous return.

In treating muscles by massage, I think we must know the construction, the structure and the composition of muscles. We are inclined to think of a muscle as a huge bulky mass, but when we come to study the structure of the muscle we find it is made up of very delicate fibers. Each fiber and group of fibers has a very definite group of muscle cells. That muscle is an organ, with a nerve supply and a blood supply to each one of these delicate fibers. We must constantly keep in mind what we have under our hands and the type of structure with which we are working. We are working with a very delicate structure of muscles, very delicate fine nerve endings, very delicate fine capillaries and blood vessels. The muscle structure is held together by a connective tissue. Continual observation and the thought of this will prevent some of the types of massage which definitely produce injury.

In addition to this normal muscle structure we must think of the pathology that is in the muscle with which we are working. Is there an increase of fibrous tissue in the muscle which may have been produced by an injury? Is there hemorrhage? Is there a disturbance of the circulation? Are we trying to increase the collateral circulation to make up for some actual destruction which has occurred in the

blood vessels? Are the nerves overstimulated? Do we wish to cause sedation? Do we wish to produce some sort of stimulation which will increase the action of the vasomotor system? All these things must be considered thoughtfully while we are giving massage. The technician should be able to give some explanation for every movement she is making. Why are you doing that type of movement in preference to some other type of movement? What do you hope to accomplish by that movement? These things should be kept in mind rather than simply devoting a certain period of time to stroking and to kneading movements.

In the literature on the effects of massage, the impression is given that massage is given to prevent muscle atrophy. When you actually study that question you will find very few definite statements that massage will prevent atrophy, but that general impression is given in the literature and I think it is the opinion which many physical therapy technicians have had. Muscle atrophy in peripheral nerve injuries and in anterior poliomyelitis often has been explained as due to disuse.

We have been fortunate in being able to assist in some experiments which were carried out to determine the effects of massage upon atrophy and the regeneration of muscle. These experiments were performed on macacus rhesus monkeys. In one group of animals the sciatic nerve on one side was sectioned and sutured immediately, the entire extremity was placed in a protective removable plaster of paris cast, and the opposite extremity was used as a control. In one group of animals the extremity was given complete rest by immobilization. In another group of animals the cast was removed daily and five minutes stroking and gentle kneading massage and passive movements of the knee and ankle were given. Another group were given daily electrical stimulation. Treatment was started two weeks after nerve section. At the end of four weeks of treatment the casts were removed and the gastrocnemius and soleus muscles of both extremities were removed and weighed. The amount of atrophy was practically the same in all three groups.

From that we were led to conclude that muscle atrophy following nerve section progresses up to a period of six weeks, despite any treatment which is given by massage and passive movement. We then made a study of regeneration of muscle and the comparative effects of electrical stimulation, massage and passive movement and immobilization upon regeneration of paralyzed muscle. In this group of animals the nerve also was sectioned unilaterally and sutured immediately. Protective removable casts were applied as before. A period of four weeks' rest was allowed before active treatment was begun. Daily treatment was given as before. After two months of treatment the gastrocnemius soleus muscles were removed and weighed. It was found that those animals that received massage by passive movement had less atrophy than the other two groups. There was 58 per cent atrophy in the immobilized group as compared to 24 per cent in the group which received massage and passive motion. Microscopic studies of the muscle showed the qualitative changes in the muscles which are typical of the degeneration of denervated muscle—shrinkage of the muscle fibers and degeneration of the cells. The muscle fibers are replaced by fibrous tissue. This fibrosis begins as early as six weeks following nerve section. Excessive fibrosis interferes with the circulation in the muscle. Because of its effect upon the circulation the use of massage aids in maintaining the nutrition of the muscle. The increased connective tissue crowds out the healthy muscle fibers. These experiments showed that massage and passive movement therapy minimize the amount of fibrosis.

The effect of massage upon circulation of blood and lymph has been studied rather extensively. A number of experimentors have demonstrated that massage very definitely increases the flow of blood. This has been demonstrated by Drinker. Another very interesting study of the effect of massage on the circulation was made by Clark and Swenson of the University of Pennsylvania. A motion picture was made of the capillary circulation in a rabbit's ear before, following and during massage. This showed an increased blood flow and the opening of unused capillaries. There was an increased sticking of the leukocytes to the capillary walls and immigration of these leukocytes through the capillary wall out into the tissue to aid in carrying on the repair process. This film is worthy of considerable study and is available for loan from the Council on Physical Therapy of the American Medical Association. The effect of massage upon the lymph has been studied by Mosengeil and McMaster. India ink was injected into joints and the extremity treated by massage. When compared to a control joint in which no massage was given, a very

definite increase in the flow of lymph was demonstrated.

Miss Rosman now will demonstrate the treatment of edema of the forearm and elbow. The one important thing in the treatment of edema is to take advantage of gravity. This is accomplished in part by having the patient recumbent but can be increased by the elevation of the extremity. It is important to have firm contact with the entire hand fitting over the area which is being treated. In order to treat the entire muscle it is necessary to have the hand make contact with as much of the muscle as possible. In the treatment of any extremity, massage should begin with the proximal portion. This is especially important in the treatment of edema. We are attempting to influence the venous circulation but if there is an obstruction of the circulation in the proximal portion of the extremity the circulation of that area must be improved before the massage can have any influence on the edema in the more distal area.

After a reasonable amount of treatment to the most proximal portion of the extremity the massage should follow on down to the distal portion, interspersing the kneading and stroking movements. It would seem reasonable to believe that stroking movements might be more effective in the actual movement of blood and lymph. Perhaps when fibrosis is present the kneading movements would be preferable because it is possible to secure more of a mechanical action upon the connective tissue. After the circulation is improved in the proximal portion (that part in which the edema is not so great), the massage is carried on down to the more distal portion and directly over the site of the edema; then again working back to the proximal portion and finishing with the massage to the proximal portion.

At this point I should like to consider the use of massage with exercise. I think we cannot separate massage and exercise. Very frequently the value of massage and the value of exercise is greatly lessened because of the customary routine of giving a period of massage followed by a period of exercise which completes the treatment. We definitely know the physiological effect of exercise is to produce lactic acid and to produce fatigue. We know that the physiological effect of massage is to increase the circulation and to remove waste products. Therefore, we have two forms of treatment which work very effectively together. It is only reasonable to believe that in order to prevent muscle fatigue resulting from a period of exercise it should be followed by a period of massage to remove waste products from the muscle. If you expect that muscle to do more exercise, it should be followed by another period of massage. These periods of massage and exercise should be interspersed. A number of periods of both massage and exercise should be given during a treatment. We are not getting the greatest benefit from our massage, and we are not getting the greatest benefit from our exercise, unless this method is followed.

In the treatment of edema we are interested chiefly in removing the waste products from the muscle, carrying off waste products and causing greater absorption.

Scar tissue and adhesions may occur in many structures: articular structures, periarticular structures, the ligaments, tendons, muscles or superficial structures. For massage of scar tissue and superficial structures it usually is conceded that a form of friction massage should be used. Friction massage is distinguished from kneading and stroking movement in that the contact is kept firmly on the skin. There must be no gliding of the fingers over the skin. In order to do that it is imperative that no lubricant be used during the frictional movement of massage. There must be firm pressure and movement of the superficial tissues over the underlying tissues. Also there must be some opposing pressure making it possible to get the stretching and lifting up movement which is necessary to stretch and loosen the adhesions in the connective tissue.

If a superficial scar is dry and scaly, as they frequently are, a lubricant may be used with a stroking movement over that surface, following the period of friction, for the purpose of softening the superficial layers of the skin. However, stroking movements with the use of a lubricant can have no effect upon loosening a superficial scar.

The use of massage, together with exercise, is demonstrated again in the use of massage during passive stretching. There may be periarticular adhesions, adhesions of the ligament and tendons around the joint. The passive stretching of the joint should be done very slowly and gradually but it will be more effective, if at the same time a definite frictional movement is performed over the ligaments and around these joint structures where adhesions have taken place.

It may be necessary to cause pain with this

type of movement. However, the pain of stretching will be greatly relieved if massage is carried on during the time of the stretching movements and during the return to the former position. Following that a massage of a stroking and kneading nature should be given directly over this joint for the circulatory and for the mechanical effect of removing waste products and to aid in the healing of the torn structures. Unquestionably there must be some tearing and stretching of connective tissues if we gain any increase in motion.

The use of massage for adhesions in muscles will follow along the same type of movement. The pressure will have to be regulated according to the firmness of that muscle. All frictional movements over the definite fibrotic adhesions in the muscle must be followed by a period of kneading and stroking to carry off the waste products.

The technic of massage for nodules is something which has been brought to our attention within the last few years. As to the actual occurrence of the formation of these fibrous nodules there is some difference of opinion. A similar type of friction massage is used to treat fibrous nodules. Again it is necessary to cause pain in removing and breaking down the nodules.

Chairman Furscott: Miss Beard has admirably brought out in her discussion that massage technic must have a fundamental scientific basis if massage is to be justified as a medical adjunct. Miss Beard also has brought to our attention that a great deal of research has been done and that there is need for further research, especially as to what type of massage shall be used to produce specific physiological effects.

With the thought of that research in mind I have prepared a bibliography with a few notes. I have divided the bibliography into three parts: general technic, physiology of massage, and a few articles on specific suggestions. I took a few notes so that you will know what is in the articles, and I think you will find there that the research already done makes us conscious of the need for further scientific study of massage.

In order to start a discussion it was planned that we take up certain questions with the members of our round table leading each question, but with the hope that everyone will enter the discussion. Such questions as: Does massage prevent atrophy? Should massage always be within the limits of pain? Are traction and manipulation a part of massage? Will the therapeutic pool supplant massage in poliomyelitis and arthritis? Does massage reduce and does massage have any place in the reduction regime?

Miss Elson will please proceed with the demonstration in respect to the first question, which is: Are traction and manipulation a part of massage?

Miss Elson: I believe that traction and manipulation are a part of massage, particularly in treating the hands or feet.

For example, in the foot, supination deformity of the anterior part is counteracted by massage in which each stroke forces the head of the first metatarsal bone in a plantar direction. In case the right foot is involved, the right hand supports the foot, care being taken to see that the heel is held in varus. The left hand grasps the foot just below the heads of the first and second metatarsal bones, with the thumb and thenar eminence on the dorsum and the fingers on the sole. As the thumb and heel of the hand are drawn distally and medially, the head of the first metatarsal is gently forced downward. As the stroke continues, the great toe is brought into flexion and abduction at the metatarsophalangeal joint, thus stretching the adductor and extensor muscles as well as the contracted lateral capsule. This is an aid in the correction of a valgus deformity at this joint. Both hands may be used in a manipulation to aid in reestablishing the anterior arch. The foot is grasped by both hands with the thumbs and thenar eminences on the dorsum and the fingers underneath. Rhythmic distal and lateral strokes with the left hand, and distal and medial strokes with the right, gently force the heads of the first and fifth metatarsal bones down and the middle three upward, aided by the upward pressure of the fingers on the plantar surface.

Contracted toes are stretched in the following manner: the heads of the metatarsal bones are supported by the fingers of the right hand and, at the same time, the thumb holds each toe in turn in extension. The contracted tendon is stroked proximally by the thumb of the left hand. Friction over the lateral ligaments of the joints may be interspersed with the stroking. The muscles always should be massaged to relax them after any manipulative movement.

Chairman Furscott: Our next question is: Should massage always be within the limits of pain? I am asking Miss Baum to answer that question.

Miss Baum: In answering this question, "Should massage always be within the limits of pain," my answer definitely is negative.

There is a specific indication for massage when pain is felt by the patient. That condition is fibrositis. Wherever there is fibrous tissue in the body we may find fibrositis. It may be in the tendons of the muscles, in the muscles themselves, around the periarticular surfaces of the joints, and so forth.

There is a question, however, as to just when manipulation or massage should be given and cause pain, whether it is in an acute stage or in a chronic stage. Having read several books on the subject, I wish to refer to Doctor Edgecomb of London, England, and one American, Doctor Cecil of New York. They say in cases of acute fibrositis it is necessary to prescribe rest and apply heat and perhaps very gentle massage. In cases of chronic fibrositis the massage should be very deep, and it should cause pain.

Fibrositis may be in different forms. It may be a swelling throughout the muscle; it may be in definite nodules which become hardened after a time; or it may be in a band of adhesions in an indurated area.

If we are massaging nodules, we should take each nodule and break it up. In many cases trouble recurs because each nodule has not been determined—we may have overlooked a few; therefore, the pain will come back. Attention should be paid to working in the direction of the lymphatic glands in order to promote the absorption of this material which is broken down.

Before treating a patient it is wise to tell him that we are going to cause pain. If the pain continues a couple of hours after a massage, it is advisable to discontinue the painful massage and give the patient only a sedative treatment. Later the deep painful massage may be resumed.

It has been said that massage is used in myositis ossificans. I have had one experience in this. I know there are three different types of myositis ossificans. From articles I have read, in the type where it is localized in one muscle group, and not of the progressive type, massage might be helpful. Of course, that would have to be painful in order to break up calcium deposits in the muscles themselves.

Another indication for painful massage is when massage is combined with stretching joints. It does cause pain, but it is a minimum pain. Massage does aid in relieving the pain of stretching, but at the same time it does cause pain.

Chairman Furscott: Does anyone in the audience think that massage should not be painful; that if you have caused pain you have defeated your purpose? (No response.)

Chairman Furscott: It appears we are a very sadistic group. I know we have all had experience with the patient who says, "That hurts, but it feels good." Probably that is true.

There was another question which Miss Beard discussed briefly in her comment: Does massage prevent atrophy? I wonder if she would go over it a little again in order to bring out the fact that it is not atrophy we prevent but the fibrosis, or I wonder if you have fully covered that?

Miss Beard: If there are any questions anyone would like to ask, I shall be glad to answer them.

Dr. Marie Facht (Denver, Colorado): Were histological studies made of the muscles, Miss Beard, in the cases mentioned where the nerve was cut? Was there a difference in the amount of fibrous tissue and fat in those muscles compared with those in which the nerve was again sutured? You said there was no difference in the size of the muscles that were massaged and the ones that were not massaged.

Miss Beard: That was true in the experiment on the study of the value of treatment in the prevention of atrophy. In the experiment to study the effect of treatment on the regeneration of muscle in which the nerve was sutured immediately, histological studies showed considerably less fibrous tissue in those which received massage as compared to the muscles which had no treatment.

Chairman Furscott: Are there any other questions?

(No response.)

Chairman Furscott: Let us have the next question: "Does massage reduce?" which will be answered by Miss Evelyn L. Anderson of Stanford University Hospital.

Miss Anderson: Unfortunately, I have not had any experience with massage for reducing weight, but all the scientific reading I could find on the subject definitely states that massage does not reduce.

Other problems are: What can be done about these people who claim that they reduce with massage? How are we going to deal with them, and how are we going to deal with the public that definitely feels that

massage is part of a reducing regime? There is no question that it improves the circulation, and there is no question that it makes the patient feel better.

We find that people who are dieting to lose weight do not care to exercise, which of course is indicated. They think massage will do the same thing. Is it worthwhile to give them that massage simply because it makes them feel better, and because it improves the circulation? Or are we going to leave it in the hands of massage parlors, where it is being done, and where many people go for massage treatment?

Massage does not break down the fat in the body and does not reduce weight. I do think we must decide whether we are going to give the massage that is done supposedly for reducing purposes, or whether we are going to let people go to massage parlors, where they are given a beating rather than a scientific massage and perhaps are having more harm done from the hemorrhage that is produced and other injury to the tissues.

It seems to me it is going to take a long period of time before we can convince the public—if we ever can—that they are wasting their money and time by going to the massage salons.

I do not know the general consensus of opinion of this group if you are required to do that sort of work. If you have requests for reducing massage, I would like to know what your answer would be. Do you have any calls for that sort of work in any of your departments?

Miss Marshall: I would say in the course of a year, I have had approximately twenty patients sent to me by medical men who referred those patients to me because they insisted on going to some reconditioning salon. Although I object to taking them, of course, I do it. They always say, "Give them as little massage as you can get away with, keep them happy and exercise them until they are tired out." I have been successful in getting away with giving them very little massage. If a patient comes in expecting to be massaged and massaged and massaged and then have a few exercises afterward, I find that if I tell her that she has to do her exercises first and then she can have some massage, I do not have to give as much massage.

Miss Anderson: That is essentially the same set-up we have. I do think, psychologically, it is a good idea for some patients to have massage along with diet and exercise. If they have to pay for their treatment, they will exercise much more than they will at home. But we are getting into the field of exercise and not massage.

Chairman Furscott: It seems to be the consensus of opinion that massage does not reduce. We have one more question and then we hope that there will be many more impromptu questions from the audience.

Can the therapeutic pool supplant massage in cases of poliomyelitis and arthritis?

I wonder if we might have an expression from those who are doing pool treatment so the rest of us may know—if they are using massage—how much massage they are using in conjunction with the pool treatments. Can you tell us anything about this, Miss Elson?

Miss Elson: Since exercise and massage have very different effects, I do not see how the therapeutic pool can supplant massage in cases of poliomyelitis or arthritis.

Miss Beard has talked about the physiological effects of massage. We do know that the physiological effects of exercise are quite different; therefore, it does not seem reasonable to assume that massage can supplant the therapeutic pool. I think it can be used as an adjunct thereto. I have not had sufficient experience in the use of both, or both together, to give any statistics.

I would like to hear from Miss Plastridge.

Chairman Furscott: We shall be delighted to hear from Miss Plastridge at this time.

Miss Alice Lou Plastridge (Warm Springs, Ga.): Massage along with the therapeutic pool has gone through various stages at Warm Springs. In the beginning, before I went there, massage was not given at all, because underwater exercise at that time was more or less experimental and only the old chronic cases went there for treatment. Therefore, an experiment was conducted to see how much benefit underwater exercise alone would be in the treatment of residual anterior poliomyelitis of several years' duration without the use of massage. With the swimming that the patients did do at that time they felt that they were getting a certain amount of very gentle massage anyway, and that was part of the treatment.

For the past two years we have had very few cases of ten or fifteen years' duration. The majority of the patients are in the early convalescent stage, and we have been giving massage to these patients. Our set-up is such that we have not been able to give the exercises and massage consecutively. We have

used the pool work in the mornings and then after lunch, relaxation and a rest period, when massage is given in the patient's room on his bed. This is not an ideal situation, but with our present arrangement it is the only way it can be done.

Just how beneficial massage has been, of course, is problematical but we have felt in the early cases, perhaps in the first three years of the disease, that it has been beneficial —after that time it is not of so much importance.

Miss Hopkins (San Diego, Calif.): I find in working in the pool with children or adults with poliomyelitis they get a mistaken idea of their muscular power if you work with them exclusively under water. Due to the buoyancy of the water they begin to think they are quite all right. If you alternate the underwater exercise with a period on the table you are able to keep the patient psychologically in balance. For example, when a poor quadriceps is exercised on the table it cannot function against gravity, but in the pool the patient is able to extend the knee freely and they get the sensation of motion and power. In that way I think your mental rehabilitation is a little more in balance.

Mrs. Anna D. Boyle (Pennsylvania): I would like to have some expression as to the value of massage under the water as compared to massage on the table. I have in mind two cases, one an injury case and the other a paralysis case.

Chairman Furscott: Is there anyone doing underwater massage who will answer that?

Miss Beard: Is there any more value in massaging a case of injury under water than there is in massaging the same case on the table? Or does it have any value in a case of paralysis?

Mr. G. Valdemar (Children's Hospital, Denver, Colorado): There is always the advantage that there is no loss of heat when massage is given in the water but there is loss of heat when massage is given on the table.

Mrs. Billie L. Crook (Texas): We think there is not quite as much danger of injury and because of the bouyancy, there is not the pull of gravity. In addition to this the heat is retained. I would like to know what other people think about it. We are just experimenting.

Chairman Furscott: It has been shown experimentally that the skin temperature raises from one to two degrees centigrade during massage. That point of no loss of heat under water is very interesting.

Would you like to ask the leaders or others any questions on technic?

Miss Anderson: I would like to ask if you always begin with the superficial stroking from the proximal to the distal. Do you do that in all massage, or do you sometimes stroke in other directions, if you are going to proceed to a heavy massage for a mechanical effect?

Miss Beard: I think direction was one of the points I intended to bring up, but which I omitted. I do follow the plan as suggested by Miss Anderson. In the superficial stroking which is given for a reflex effect, direction is unimportant; it makes no difference in which direction it is given. If you are doing superficial stroking alone, I think you will find that it will be more pleasing to the patient if it is given from the proximal to the distal portion. However, if you are expecting to work from superficial stroking into deeper stroking for a mechanical effect, I think it is advisable to begin in the centripital direction. I think that is especially true where you are working over sensitive areas, or perhaps on recent fractures where there are painful areas. You can, as it were, "sneak up on your patient." After you have given some superficial stroking you can gradually increase the pressure and approach the more sensitive areas, working into a deeper massage for the removal of waste products after you have attained relaxation.

Chairman Furscott: I noticed in the demonstration when you were giving the reflex massage the hands were taken off the patient's body when working in the opposite direction. Was that because there would not be enough shade of difference if you touched the patient in both directions?

Miss Beard: I think you cannot maintain perfect rhythm which is important in superficial stroking.

In the superficial stroking it is impossible to get the same amount of rhythm by changing the stroke and going back in the opposite direction. You get greater relaxation and a greater sense of comfort from your superficial stroking, if it is always given in the same direction. That is one of the characteristics of superficial stroking, as it has been described by Mennell, and as he learned it from Lucas-Championnaire.

A Member: When you are doing the deeper stroking, do you keep your contact?

Miss Beard: You do keep contact whenever possible except with superficial stroking.

The Member: I think at one time they taught us that we should break our stroke; however, we have found most of our patients prefer to have the hands in contact.

Miss Beard: The less you break your strokes, when you are trying to do a sedative massage with the deeper stroking, the greater benefit you will get from your return superficial stroke.

Miss Anderson: Some authority stated that superficial stroking could be done only with a perfectly dry surface. Do you agree with that? That talcum is the only lubricant that could be used with superficial stroking?

Miss Beard: I think too much of a lubricant makes it a little difficult in making your contact. I think you can have a lighter touch without any lubricant.

If a person's hands are dry and the skin is dry, or nearly so, it is preferable to do any type of massage without lubricant. You cannot get as firm contact if an excessive amount of lubricant is used. Of course some people's hands are moist and in that case it is necessary to use a lubricant to prevent friction.

Chairman Furscott: As I listened to this very illuminating discussion I made a little summary which I should like to leave with you.

We have shown today that massage is not a miraculous cure-all, but, as it has been said over and over again by the speakers at this convention, it is a valuable part of our work. Its use may be combined with heat and exercise. It does not cause the alkalosis of heat nor the acidity of exercise, and therein, perhaps, lies much of its value. Many claims have been made for its use which we know to be based on false premise. In the light of experimental and clinical experience it can have reflex or mechanical effect, or both, depending on technic. It can cause vasodilation or vasoconstriction, also depending upon technic. It can be stimulative or relaxing; it can relieve or cause sensitivity; it can relieve fatigue or produce fatigue, all depending upon technic. It may not reduce; it may not prevent the inevitability of atrophy; it may not promote bone growth, but it does remove waste products; it does reduce edema; it does stretch scar tissue, whether that be superficial or deep, but its efficacy is absolutely dependent upon technic.

Our hope is that we have brought to you in this discussion the thought that in giving massage you will keep in mind what effect you desire for the specific case being treated and adapt your technic to this desire and thereby accomplish your aim.

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The Physiotherapy Review

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As we enter upon 1940, a new year and a new decade, it is interesting to view the growth of the American Physiotherapy Association during the past ten years. In 1930 the association was comprised of 15 chapters with a total membership of 534. At the beginning of 1940 there are 22 chapters and 1034 members which is a 100 per cent increase in members and a 50 per cent increase in chapters. The increase in the number of members may be used as an index of the growth and the recognition of physical therapy throughout the country. During the past year there was an increase of 97 members. If this rate is continued during the next ten years we again will be able to note a 100 per cent increase in our membership at the end of the present decade. Since we still are young and growing, having been organized but little more than two decades, we feel that the future holds great promise for us in our chosen profession.

In 1930 there were eleven schools approved by the American Physiotherapy Association, graduates from which were eligible for membership in our association. Today there are 16 schools on the list approved by the American Medical Association. Six of those schools approved by the American Physiotherapy Association in 1930 are now included in the list approved by the American Medical Association. It was a step forward in the history of our association when in August 1936, the American Medical Association published its first list of approved schools. With the increasing demand for adequately trained technicians, we hope that more schools will be established, especially in those sections of the country that at the present time do not have facilities to meet this need.

The REVIEW also has shown a gratifying growth. In 1930 there were approximately 75 subscriptions outside of the membership list. Today there are over 350 such subscriptions and the magazine is being sent to all parts of the world. This means there has been a 400 per cent increase in subscriptions during the past ten years. Since 1930 there has been a 30 to 40 per cent increase in the contents of each issue of the magazine. This includes original articles, abstracts of current literature and book reviews. In 1930 the book reviews averaged one, two or three in each issue; today our magazine contains from nine to nineteen reviews. This, we feel, is recognition on the part of publishing companies that our publication is a valuable source for acquainting the profession with new books.

We could go on further with comparisons and study of the struggles and accomplishments of our association during the past ten years, but as we view the gains we have made in these tangible items we also can measure to some extent the ever widening influence of the association in the field of physical therapy. We can be assured that during the next ten years the standards of physical therapy will be maintained and there will be a sufficient number of trained technicians to fulfil the demands created by the ever increasing number of new physical therapy departments. Our growth and progress has been accomplished and will continue only through the untiring efforts of every member, the executive committees, chapters and THE PHYSIOTHERAPY REVIEW, as well as through the interest and cooperation of the Advisory Committee of the American Physiotherapy Association, individual members of the medical profession, the Council on Physical Therapy and the Council on Medical Education and Hospitals of the American Medical Association.

Nineteenth Annual Convention

The New York Chapter cordially greets all members of the Association at the turn of a New Year and hopes to have the pleasure of welcoming as many as can possibly attend the Nineteenth Annual Convention to be held at the Hotel Biltmore, Madison Avenue at 43rd Street, New York City, June 23 to 28, 1940.

Our tentative program is as follows:

Sunday—June 23
Registration
Supper—Three minute chapter reports

Monday—June 24
a.m. Address of Welcome
Business Meeting—Report of Nominating Committee
p.m. Round Table Discussion on Spastics to include:
Speech Correction
Psychiatrist
Demonstrations of technic
Occupational therapy

Tuesday—June 25
a.m. Short Wave Diathermy—Lecture
Physical Therapy in the Treatment of Peripheral Vascular Diseases—Lecture
Noon—Officers' Luncheon
p.m. Trip to the World's Fair (optional)

Wednesday—June 26
a.m. Business Meeting—Election of Officers
p.m. Pelvic Obliquity—Lecture
Arthritis—Lecture
Eve. Round Table Discussion on Education

Thursday—June 27
a.m. Time to view exhibits
Fractures—Lecture
p.m. Erb's Palsy—Lecture
Galvanic Nerve Testing—Lecture
Eve. Banquet (Formal)

Friday—June 28
a.m. Round Table Discussion on Muscle Studies
Muscle Training
Gaits
p.m. Visits and Clinic

In addition to the banquet, there will be an evening at Bear Mountain Inn, returning by way of the beautiful Hudson River, thus affording an opportunity to see the splendor of the Palisades at sunset.

The attractions of New York City are well known, and there is something of interest for everyone, the most important of all is the *1940 World's Fair* which promises to be bigger and better than that of 1939.

Sight seeing excursions will be arranged, and everything will be done to make your visit to New York City as profitable and pleasant as possible.

Chicago Chapter

A dinner was given on January 8, 1940, in honor of Miss Thecla Doniat upon her retirement as principal of the Jesse L. Spalding School for Crippled Children. Miss Doniat has been active in crippled children's schools of Chicago for twenty-one years, as principal of the Fallon, Jahn and Spalding Schools. She was at one time an honorary member of the Chicago Chapter of the American Physiotherapy Association and has for many years given her moral support and shown sincere interest in the chapter. Miss Doniat was one of the organizers and is at present a director of the Illinois Association for the Crippled. The many testimonials of Miss Doniat's work given by Mr. Paul King, Dr. Morris Fishbein, Dr. J. S. Coulter and others were evidence of her wide-spread interests and influence.

New York Chapter

Livia Trocchia, of the Physical Therapy Department of R. H. Macy's Hospital, New York City, was married on November 19, 1939, to Mr. Ray E. Traux, also of New York City.

Ohio Chapter

On November 11, 1939, the Ohio Chapter held its semi-annual meeting at the Randall J. Condon School in Cincinnati.

The Ohio Chapter has found it necessary to form a Southern Ohio District in order to accommodate all members located in that part of the state.

Washington Chapter

On May 20, 1939, a second son was born to Mr. and Mrs. Madison. Mrs. Miriam Madison is in charge of the physical therapy department at Virginia Mason Hospital in Seattle.

Miss Florence Brown of the Children's Orthopedic Hospital, Seattle, was married on September 3, 1939, to Mr. Vernon Humphries, also of Seattle.

Wisconsin Chapter

Florence Miller, 211 S. Rankin Street, Appleton, Wisconsin, has been appointed chairman of the Bureau of Appointments of the Wisconsin Chapter.

Courses for Graduates, Harvard Medical School

Philomela Mavridou, registered nurse of Athens, Greece, is a student in the nine months' course in physical therapy at Harvard Medical School. Miss Mavridou is on scholarship from the Near East Foundation and is preparing to work with Miss Katharine Lorrilliere at the Center for Crippled Children of the Near East Foundation after her return.

Public health nurses from three states are now taking the nine months' physical therapy course at Harvard Medical School as a part of their programs for the care of crippled children. The students are: Miss Hazel Johnson from Indiana; Miss Annette Larson from Minnesota, and Mrs. Carrie Price from New Hampshire. The Detroit Visiting Nurse Association is another public health agency represented by a member of its staff, Miss Helen LaSalle. The Spring class included three other public health nurses on leave for study: Miss Ione McNeil from the Minnesota State Department of Health; Miss Marion Pang from Honolulu Board of Health, and Miss Lena Plaisted of Milwaukee Visiting Nurse Association.

Harvard Infantile Paralysis Commission

Although a successor to Dr. Arthur T. Legg has not yet been appointed, Dr. A. H. Brewster, an associate of Dr. Frank R. Ober and a member of the staff of Children's Hospital, Boston, is in charge of the clinic at the present time.

The exhibit prepared by Helen S. Foss and Marjery Wagner of Children's Hospital, Iowa City, Iowa, has been donated to the American Physiotherapy Association and is being used as part of their permanent exhibit material. This exhibit, which was shown at the annual convention in Denver, June 1939, consists of a model of a gymnasium for treating scoliosis by the derotation method.

As a result of the expressed desire of her clientele and the opinion of several leading physicians and technicians that the safe, effective exercises of Wanda Bowman-Wilson be made available to greater numbers than is possible in her studio, she has recently made an album of four well-planned records ("Streamlining Your Hips and Thighs," Victor. Price, $5.00).

At the 18th annual convention a new committee was formed to establish relations between the American Physiotherapy Association and other organizations. Miss Hazel Furscott, 219 Fitzhugh Bldg., San Francisco, Calif., was appointed as chairman of this committee on relations.

At the present time there are the following representatives from the American Physiotherapy Association to

(1) *Advisory Board of the American Registry of Physical Therapy Technicians*—Janet B. Merrill, 300 Longwood Avenue, Boston, Mass.

(2) *Advisory Committee of "The Crippled Child" Magazine*—Emmy Kylin, 409 Prospect Road, Ashtabula, Ohio.

(3) *Advisory Committee on Services for Crippled Children*—Mildred Elson, 737 N. Michigan Avenue, Chicago, Ill.

(4) *National Organization for Public Health Nursing*—Florence Phenix, 522 N. Pinckney, Madison, Wis.

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Excision of the Patella in Arthritis of the Knee Joint. E. J. BERKHEISER, M.D. J. A. M. A., Dec. 23, 1939.

Reconstructive and Stabilizing Survey for Residual Suppurative Arthritis of Hip Joint. HALFORD HALLOCK, M.D. J. A. M. A., Dec. 30, 1939.

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Use of Heparin in Subacute Bacterial Endocarditis. MEYER FRIEDMAN, M.D.; W. W. HAMBURGER, M.D., and L. N. KATZ, M.D. J. A. M. A., Nov. 4, 1939.

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ABSTRACTS

John S. Coulter, M.D.

Orthopedic Care of Convalescent Poliomyelitis

W. Vernon Newman, M.D. Little Rock, Arkansas. In Southern Med. J., 32:9:900, Sept. 1939.

The general plan of treatment used by most orthopedic surgeons is absolute rest during the acute stage. Some apply splints. Light massage may be given with the idea of relieving muscle tenderness. In the convalescent stage, rest and prevention of deformities are obtained with the aid of circular plaster casts or splints. As soon as muscle tenderness disappears, usually two to eight weeks, physical therapy is cautiously initiated. Rest in splints is continued for as much as six months. Weight bearing is permitted with the aid of braces at the end of six months' time.

It appears, therefore, that absolute rest until maximum nerve supply has returned is paramount. Our clinical observations tend to verify this. In the acute stage, systemic rest may be maintained with elixir of phenobarbital. Rest to the spinal cord is obtained with a small pillow under the back to maintain extension of the spine. The extremities are neglected until the acute symptoms have subsided. This usually takes two to three weeks. At the end of this time the weakened and paralyzed muscles are placed in circular plaster of paris casts. The spine is protected by hyperextension in all instances. In cases involving the neck muscles the head is included.

Great caution is taken to build up the nutritional state of the patient. Malt extracts rich in vitamins have been effective in stimulating poor appetites. The rest consists of a daily balanced diet of the essentials, carbohydrates, proteins, fats, vitamins and minerals.

Braces are used after 50 per cent function is demonstrable to permit underwater exercises. Also they are used to permit weight bearing and prevent deformities which casts fail to control.

The dividing line between maximum or adequate benefit from physical therapy and the danger zone of its use is too narrow for comfort of even the skilled technician. Heat, massage, passive motion and electrical stimulation of weakened and paralyzed muscles were used in a group of these cases. These were given very cautiously and by a trained technician. All cases ceased to improve. Many began to lose strength, some of which they later regained by absolute rest. For these reasons we abandoned the use of these methods of treatment. Of all available methods of physical therapy, hydrotherapy offers the safest and greatest benefit. Even this treatment, we feel, should not be instituted until the muscles show at least 50 per cent recovery. This method has been and can be applied successfully in the family bath tub by intelligent mothers.

Its advantages are:

(1) It is more restful than dry heat.
(2) It permits more active exercise with less fatigue.

(3) In active motion of the parts the child automatically refrains from overstretching the muscles.

Exercise out of water are begun when the patient can spend one-half hour in the tub without fatigue. Even then, the exercises are limited to one or two motions of the part. These exercises are gradually increased as muscle strength improves.

Etiology and Treatment of Spasmodic Flatfoot

Alan H. Todd, M.S., B.Sc., F.R.C.S. In the British Med. J. No. 4106, September 16, 1939.

The mainstay of treatment is, the author submits, complete physiological rest: the patient must, before all else, be taken off his feet. It is a good thing to put the affected foot or feet into plaster of paris, for this measure gives the maximum rest. It has been suggested that the eversion of the foot is simply an example of protective muscular rigidity (Sherrington's "myotatic reflex"), the foot being held in the position of rest or relaxation, in which the joint surfaces on the inner border of the foot are held apart and the joints themselves are in their position of greatest capacity.

The author cannot see that manipulation has any logical basis in the treatment of this particular form of flatfoot, though it is of great value in other forms, notably in cases with pain due to adhesions. In the few cases of true acute spasmodic valgus in which I have seen manipulation tried it has failed completely.

As a general rule not less than six weeks' fixation in plaster of paris is needed to bring about lasting relief of the eversion spasm, and in severe cases, especially among the older boys, eight weeks' fixation is better. When the plaster has been taken off, weight bearing must be very cautiously resumed. Usually it is wise to make the patient use crutches at first; then gradually more weight can be borne on the foot, with the aid of two sticks, and then of one. Passive movements of the foot are contraindicated, though the use of heat as a sedative may be recommended; the whirlpool bath may be used, or, in the home, soaking in a pailful of hot water before exercise. Inside wedging of the sole and heel of the shoe is a wise precaution, and in severe cases showing a tendency to relapse it is well to make the patient use an outside steel and inside wedge and T-strap for a year or so.

Clinical Application of the Paraffin Bath

Walter J. Zeiter, M.D. Cleveland, Ohio. In Arch. P. T. XX:8:469, August 1939.

Paraffin may be used whenever a local form of heat is desired. Because of its simplicity of application, it is especially adaptable for the hands and feet. Excellent results have been obtained in treating arthritis. In most instances it is well tolerated, gives a soothing feeling and produces relief of pain. After its removal, it leaves the skin oily, which is very suitable for massage. In most instances the paraffin bath is used daily in treating arthritis, followed by massage and exercise if indicated. It is also effective in stiffness of joints following lacerations or infections, in the treatment of scars restricting motion of joints and tendons, in involvements of joints secondary to lesions of nerves, in sprains and in contusions. In other conditions, such as fibrositis of the lumbar area, it can be applied with a paint brush as described above.

Because of the marked heat, the paraffin bath must be used judiciously in old, weak and debilitated individuals. If circulatory and sensory changes are present, paraffin should be used with caution because of the danger of burns. Open wounds, cuts and infections of the skin are better treated by other methods. If the ordinary precautions mentioned above are taken, burns will be avoided. Repeated use of the paraffin locally in some patients may rarely produce a mild erythema *ab igne*.

The objection has been made that the paraffin bath is less sanitary than other procedures. Cultures made from the baths have been positive when taken immediately after use. After standing for some time before cultures were again taken, no growth resulted. With the ordinary precaution of cleaning out the tank, using new paraffin, insisting that each extremity be bathed before the bath is used and if open wounds, cuts and skin infections are treated by other means, this objection becomes negligible.

The paraffin bath affords a simple and efficient method of applying heat.

After the application of the paraffin, the skin remains soft and pliable and in excellent condition for massage.

No unusual value is attributed to the paraffin except its heating properties.

It is simple to operate and maintain, and the cost of upkeep is low.

It is available for use in the home.

The Methods Used in Handling the Epidemic of Poliomyelitis in Ontario in 1937

A. B. LeMesurier, M.B., Toronto, Ontario, Canada. In J. B. and J. Surg., XXI:4:967, October 1939.

The arrangements for the instruction of the parents in the care of the children at home were made difficult by the fear that contagious diseases might spread in the hospital (Ontario Orthopedic) among children of this age, and, until two days before their discharge from the hospital, the children were not visited by anyone except the hospital workers, and these all wore gowns and masks. Two days before they left the hospital the children were transferred to "discharge wards," and during these last two days each child was looked after entirely by one parent, usually the mother, who did everything for him under constant supervision and instruction. She washed him, dressed him, made his bed, fed him, brought him the bed pan, took his splints off, gave him the necessary massage and passive movements and put his splints back. By this time the child had a pretty good idea of what should be done and was very much impressed with the need of wearing the splints properly and of avoiding overstretching of the muscles; usually the child and parent cooperated very well. This short intensive course of instruction probably succeeded in teaching the parents more about looking after their children than would have been accomplished by a much longer course, consisting chiefly of visiting and watching, combined with lectures and demonstrations. It was thought, however, that the time of instruction might have been increased to three days with advantage.

This training period in the hospital, after the acute stage, was quite a success, and in most cases the routine care and treatment were continued at home surprisingly well. The "discharge wards" were so useful in training the parents that it was thought that the same idea could be carried out with advantage in any children's hospital where a child was being discharged and needed some special care or treatment carried out at home.

After leaving this hospital, the majority of the children went home. If the home conditions were bad or if the paralysis was extensive, they were transferred to wards arranged in another hospital and a good many of the severe cases are still there under treatment. The treatment of the patients who went home was supervised by their own doctors working in conjunction with the out-patient department of the hospitals. The actual general care was assumed by the parents, who had to adjust the splints and to do the necessary massage and movements. These children were visited by the public health nurses and when it seemed necessary by physical therapists. They were examined fairly frequently by their own doctors and were sent to the out-patient departments at intervals. Those who lived in town reported to the clinics fairly frequently, but those who lived some distance away were sent down by their doctors when some change in treatment was indicated. On each visit to the hospital the way in which the mother was doing the massage was checked up, any necessary repairing of the splints was done and the doctor in charge of the case was written to about subsequent treatment.

On the whole this method worked out very satisfactorily. Perhaps the treatment at home was not carried out quite as efficiently as if the child had been in a hospital all the time, but it was carried out surprisingly well. If the treatment was obviously being done badly, even with increased help and supervision, the child was admitted to a hospital, but there were few cases when this was thought necessary. One of the most pleasing points about the whole system was the way in which everyone cooperated. All the doctors had about the same idea as to what should be done and worked together in seeing that it was done, and as a rule the parents and even the children made an effort to do what they could toward carrying out their part.

Further Studies on the Treatment of Chorea and Rheumatic Infection by Fever Induction

Edward L. Bauer, M.D. In Amer. J. Med. Sci., 198:2:224, August 1939.

Fever induction therapy was practiced in all 70 cases. Five of these (children) were treated by a competent physical therapist using the diathermy machine to induce fever. The patients responded quite as well from the standpoint of the amelioration of the choreiform movements as with other methods of fever induction. A greater number of children were not subjected to this treatment because they could not be controlled sufficiently well to keep them in the apparatus and adequate febrile reactions could not be obtained. This method therefore is held in

reserve for older, more readily controlled patients rather than abandoned entirely.

In 65 cases, fever induction was practiced by means of typhoid paratyphoid vaccine administered intravenously as suggested by Sutton.

From this and the earlier series of cases of chorea we feel justified in averring that fever induction is an important and valuable addition to our therapeutic armamentarium. The danger in its use, that is, collapse and cardiac dilatation, can be eliminated by expert application of the method. True chorea in childhood is generally rheumatic in origin. Care in diagnosis will prove this. The need for antirheumatic treatment and management is necessary for a complete ultimate recovery for these patients.

The use of sodium salicylate in large doses is helpful. The erythrocyte sedimentation rate is a valuable guide in determining rheumatic activity or quiescence and is consistent in the choreic as in the nonchoreic rheumatics. The management of the patient as a potential rheumatic in the quiescent period must be carried out over a long period of time and the methods of such management must be improved upon generally. It is hoped that the suggested plan practiced by us will prove a step in this direction.

American Spa Therapy in the Treatment of Rheumatoid Diseases

J. Ed. Baird, M. D. Excelsior Springs, Mo.
In J. Missouri M.A., 36:7:272, July 1939.

Therapy

Mineral waters are complicated medicaments. The therapeutic results are not due to their predominating mineral salts alone. The most commonly accepted belief is that the ions are dissociated and electolytic forces are released, acting as adjuvants in the production of the resultant effects. This is an admission of empiricism but one should remember that clinical experience is the final test of any therapeutic agent.

Of one hundred consecutive cases treated recently by the writer for rheumatic diseases, nine cases showed no improvement, twenty cases showed moderate improvement, forty-three cases showed great improvement and twenty-eight cases showed a disappearance of all symptoms both subjective and objective. The varying results obtained were governed somewhat by the length of stay.

The Therapy of the Cook County Hospital

Edited by Bernard Fantus, M.D., Chicago.
In J.A.M.A., 113:8:676, Aug. 19, 1939.

The Therapy of Chronic Arthritis

In Collaboration with Dr. E. F. Traut.

There are three ways in which arthritis may be produced. One is from without (trauma or strain); another is from within (e. g., infection.) The third combines these two, the effect of strain on a joint damaged by disease resulting in a vicious circle.

Chronic arthritis may be divided into two forms: specific and nonspecific. In the specific varieties it is assumed that the causal organism has been isolated or the metabolic or mechanical causative agent has been recognized. A knowledge of the cause is the most rational lead to success in therapy.

Removal of Foci of Infection

Today the profession is much less enthusiastic, dogmatic and drastic in its attack on foci of infection.

We know that all infection has a natural tendency to recovery. Were there a single infection from which recovery is impossible, humanity would have long since been exterminated by that infection.

The patient's systemic resistance requires building up. The patient's food habits demand investigation, particularly as to his vitamin intake.

Heliotherapy is just as beneficial in increasing the resistance in the arthritic as it is in the tuberculous. Living and sleeping outdoors therefore is ideal, provided the patient is not chilled and that he is carefully protected against sudden changes of temperature. Warm socks and gloves are of comfort. Change of climate from the North to the South in winter is advisable whenever this is possible. Ultraviolet rays increase resistance if used generally and may relieve pain when applied locally.

Physical therapy is much more important in chronic arthritis than is medicinal therapy. In the acute stages rest and heat are indicated, while such evil effects of rest as weakening of the muscles and stiffening of the joints must be antagonized by appropriate massage and active exercises.

Local rest is demanded by any acute exacerbation of chronic arthritis and by local disease, whether this is due to trauma (sprain or strain) or from occupation (e. g., "air-hammer elbow"), relaxation of the ligaments (sacroiliac), flat foot, bursitis (q.v.) or neuritis (q.v.)

Production of hyperemia is of value for antibacterial, analgesic, reparative and resorptive effects. Thus heat is employed to relieve pain and stiffness, to induce relaxation before massage and to encourage certain poorly understood, favorable metabolic processes in the affected part. Acutely inflamed joints should be exposed for an hour or two daily to a cradle containing four electric light bulbs, screened so that the patient cannot burn himself, or be wrapped in hot voluminous dressings of half-saturated solution of magnesium sulfate. A convenient method of the application of heat is the hot paraffin film. This is applied by melting (low melting point 150 F.) paraffin and, when it is just at the congealing point, coating the affected part by dipping it in and then withdrawing it or by painting the melted paraffin on the surface until several layers are applied. The film is left on for three-quarters of an hour or until it comes off easily. In the subacute and chronic types these forms of the application of heat should be dictated by the demand for the relief of pain; counterirritation should be employed to improve the local circulatory activity, as by painting the affected joint with tincture of iodine, applying small cantharides plasters to persistently tender points or "baking" the limb for from twenty to thirty minutes once a day in severe cases ranging down to two or three times a week in others. Short wave or classic diathermy several times a week is of similar value. The local use of ultraviolet rays may also be mentioned here.

Retentive appliances are important. The prevention of deformity is much easier than its cure. It demands persistent efforts to antagonize contractures.

Mobilization therapy should be instituted in atrophic arthritis as early as possible.

Massage always should be preceded by hyperemia (e. g., heat) and followed by rest.

Exercise is encouraged up to the patient's tolerance. Marked fatigue or pain lasting into the next day is a sign that his disease-instituted limits have been exceeded. The patient is taught exercises especially adapted to the joints involved. Movements often are possible in warm water that are impossible out of it. The majority of patients are improved by the performance of such postural exercises as those of Goldthwaite and Osgood. These exercises should be taught and frequently rehearsed.

Summary

To be successful in chronic arthritis the proper treatment must be started early and continued over a long time. Too commonly the diagnosis of "rheumatism" is made and everything that is prescribed in consequence (keeping the patient indoors, the prolonged use of heat, a protein diet, large doses of salicylate) does more harm than good. The treatment should be more nearly like the general regimen of tuberculosis. The patient's whole mode of living needs to be changed.

The Diagnosis and Treatment of Fibrositis and Neuritis

A. R. Neligan, M.D. In the Practitioner, CXLIII:3:263, September 1939.

Acute Fibrositis: It is enough to mention the general principles of treatment:

(1) Relief of pain by rest, heat, analgesic drugs and applications.

(2) Elimination of toxins by skin, bowel and kidneys.

(3) Clearing up of fibrosed areas by massage, movements and heat.

(4) After-treatment: eliminating source of toxin, skin-training, change of air.

Chronic Fibrositis. (1) Treatment of source of toxin—The mouth and throat, and the digestive tract are specially important.

(2) Physical methods. Rest, including strapping and slings, must now be replaced as a general rule by movement, though it should be remembered that people with chronic rheumatism tire easily. Heat and massage are the commonplaces of treatment, but they must be used with care; exercise or manipulation may be added as needed. Heat may be moist or dry. Treatment may be once a day or twice in severe pain, for twenty to thirty minutes; it may be given with, or, more usually, before massage. Diathermy is useful for heating deep tissues in chronic fibrositis; it is best given by experts. Massage should be given by a fully qualified person. It is well for the physician to see the patient with the technician, for though the technician will have learned to deal with most of the common conditions for which massage is used, she should be given certain information and instructions. The diagnosis, the parts to be treated and the aim of the treatment; the presence of special feaures, such as nodules, bursitis neuritis, varicose veins, the frequency and duration of treatments; whether preliminary heat (a bath or infra-red ray, for in-

stance) is to be given to lessen pain or spasm; what movements or exercises are to be done, if any; the duration of rest after treatment. Massage is commonly given every second day for a fortnight or three weeks, more frequently and for longer in panniculitis. In the acute stage of fibrositis massage should consist merely of light stroking; after it the indications are pain and stiffness, especially if there are nodules. Massage need never be heavy to be effective unless there are old fibrositic deposits. Muscular relaxation is not only essential for massage to be effective but it should be taught as one means of preventing relapses. Massage is, as a general rule, ill borne in neuritis, but gentle rubbing with A.B.C. or methyl salicylate liniment may be given; if associated fibrositis has to be treated the track of the nerve should be avoided.

Periarticular fibrositis of the shoulder—In the acute stage the arm should be rested on a pillow or in a sling and kept abducted. Active movements should be begun early, assisted at first if necessary. (1) Abduction of the arm along the mattress while lying flat, and rotation of the humerus with the forearm bent at a right angle; this may be repeated as a manipulation, later in the treatment, with the patient sitting in a chair, his scapula fixed by the free hand of the operator standing behind him, two or three times a week. (2) Swinging movements of the arm allowed to "hand dead"; the extension effect may be increased by holding a bag of sand. (3) Steady traction of the abducted arm for two minutes at a time is also useful when movement has become limited; masseuse and patient should hook their hands together in the "golf grip." (4) The patient should carry his hand behind his neck and behind his back several times a day. These measures can be combined with courses of local heat or hydrotherapy. When movements have become seriously restricted recovery is slow but generally sure. Manipulation under general or local anesthesia has been advised as a short cut, but the after-treatment demands more fortitude than it is fair to expect from, at any rate, elderly patients.

The Formation and Movements of Lymph

Cecil K. Drinker, M.D., D.Sc., Boston, Mass. In Amer. Heart J., Vol. 18, No. 4, October 1939.

Drinker believes that there is no longer serious debate as to the fact that typical normal blood capillaries, such as those in the skin and in the subcutaneous tissue, are somewhat permeable to serum albumin and serum globulin. These proteins are normal constituents of lymph wherever it is collected, and there can be no doubt that they filter from the blood capillaries practically all over the body.

Whether or not lymph and tissue fluid are reasonably identical in composition must continue to be the subject of experiment, and direct experiment if possible. But whatever the final result may be, there can be no doubt that lymph is formed from the extravascular tissue fluid, and the state of this fluid in the tissues is thus a matter of consequence for us. All varieties of experiment show that in normal tissues very little free fluid exists. A hypodermic needle thrust beneath the skin produces nothing.

Observations such as these have caused it to be held that the tissues contain no free fluid, that the extravascular environment is a sort of gel. While the author is in absolute agreement with the conception that there is little free water in the tissues, he does not see how they can resemble a gel. One may thrust needles into gelatin as long as one pleases, and no water will escape even though the gelatin is quite fluid. Also if there is no free fluid in the tissues, how does one account for the fact that though lymph is ordinarily small in amount, still it is there, and no one has ever demonstrated glandular activity for lymphatic endothelium, secretory ability such as is possessed by the salivary glands in abstracting water and other substances from the blood. The formation and composition of lymph depend upon the status of the tissue at the moment.

All evidence indicates that the lymph keeps closely in touch with the extravascular environment, and the prime function of the lymphatics is to remove extravascular protein which in their absence accumulates and leads to edema. The lymphatic endothelium is apparently very permeable to the blood proteins and to many things of even larger size which do not enter the blood when deposited in the tissues.

The formation of lymph is thus, first of all, dependent upon the amount of free fluid in the tissues, and second, upon influences which empty draining lymphatics and permit further absorption of raw material by lymphatic capillaries. Pullinger and Florey found that lymphatic capillaries are attached to surrounding tissues. When edema occurs, though

tissue pressure may be increased, they are pulled open, and the permeability of their walls for the constituents of the edema fluid causes them to fill with it. If edema formation is abrupt and continuous, the mere fact of its existence may produce lymph flow from trunks draining the part. Some years ago we cannulated an ankle lymphatic in a dog and then dipped the foot in very hot water for two minutes. The foot swelled rapidly, and lymph which was practically blood plasma flowed in a steady stream from the cannula, which was placed well above the lesion. But to secure an increase in lymph flow from edema alone one needs a rapid, marked increase in tissue pressure, and in the ordinary congestive edema this does not occur. If, however, the edematous part is massaged or moved actively or passively, lymph flow will be more rapid than normal. The bedridden patient with cardiac edema delivers exceedingly little edema fluid back to the circulation via the lymphatic system. Only by movement or massage can any impression be made.

The extent of the lymphatic capillary system in the skin is little appreciated. There are two plexuses, a superficial one just beneath the epithelium, containing few valves, and a second in the deeper part of the corium and in the subcutaneous areolar tissue beneath it. The two plexuses communicate freely and empty into large valved trunks which are found close to the veins. The arrangement is, in effect, an enormous superficial net containing very few valves in the outer part, and continuous all over the body. In the outer plexus lymph will move in any direction decreed by gravity, by motion or by massage. The difficulty of obstructing the superficial network is obvious enough. Nothing short of complete destruction will accomplish it. The anatomic arrangement makes it clear that if one gets obstruction of the deeper lymphatics in a part, it is still sometimes possible to discover superficial vessels; and if the part is massaged or given opportunity to drain by gravity, lymph may find its way in the meshwork as the external force directs it.

It is easy to collect skin lymph from a cannulated ankle lymphatic in a dog. If we cause such an animal to walk until lymph flow becomes constant, and then permit him to rest for half an hour before again walking at the same rate, he will invariably begin the new period of movement with a large flow of lymph which will decrease as walking continues. When he lies still no lymph leaves the part, and fluid apparently accumulates until tissue pressure balances filtration pressure. Under these circumstances water and crystalloids may be absorbed by the flow capillaries and replaced from them, but, after a time, loss of protein from the capillaries must be slight. As soon as the animal walks, tissue fluid and lymph are caused to enter and move in the lymphatics, and capillary filtration may again become active.

If heat is applied, gradually increasing lymph formation begins at about 42 C., and changes not readily reversible begin to appear around 50 C. The lesson of such experiments is simple enough. One can expect decided increases in tissue fluid with tissue temperatures around 42 to 45 C., just about the limit of one's tolerance for heat. If it is of advantage therapeutically to increase both the vascular and extravascular circulation, then it is obvious that a part should be heated and at the same time massaged mechanically or moved passively.

The Diagnosis and Treatment of Athetosis and Dystonia

Tracy J. Putnam, M.D., New York City. In J. B. and J. Surg., Oct. 1939.

Recent neurological investigations indicate that a subdivision of the field is important not only for scientific purposes but also in prognosis and in treatment. Three main types of "spasticity," "rigidity" or "cerebral paralysis" may be recognized at present — hemiplegia, parkinsonian rigidity and athetosis or dystonia.

Hemiplegic spasticity includes monoplegia or hemiplegia resulting from injury to the motor and "premotor" cortex. There can be no doubt that bilateral injury to the motor cortex (for example, of the legs, on the mesial side of the hemisphere) leads to a more profound weakness and spasticity of both sides than occurs on either side from a unilateral lesion. The usual picture of hemiplegia from a cortical lesion is that of the flexed arm and extended leg, which are relatively weak and lacking in dexterity. There is an increase in the deep reflexes and in the extensor response of the toes. The spasticity affects almost exclusively the "antigravity" muscles; the triceps, for example, is relaxed and weak. Involuntary movements do not occur when the lesion is confined to the cortex or to the pyramidal tract.

Parkinsonian rigidity is demonstrated in

its purest and most striking form in the victims of juvenile paralysis agitans, such as that seen as a sequel of epidemic (lethargic) encephalitis. It is well described in the words of Hughlings Jackson as "tremor run together," and often myograms or even palpation will reveal a tremulous element. As in the obvious tremor of paralysis agitans, agonists and antagonists contract in bursts alternately at a fairly constant rate of six to ten per second, and the rigidity is caused by a confluence of bursts affecting both agonists and antagonists.

Athetosis and dystonia refer to an apparently similar physiological mechanism, which expresses itself in the former case by abnormal involuntary movements and in the latter by involuntary postures. Either or both may coexist with severe injury to the pyramidal tract or with an alternating (parkinsonian) tremor. The disorder may affect the muscles of articulation alone, the face, the neck alone (torticollis), one extremity, both extremities of one side, both arms, the trunk or almost the entire skeletal musculature. The involuntary movements shift irregularly from one group of muscles to another; they are increased by effort or emotion; the contractions are smooth, powerful and sustained, and there is simultaneous innervation of agonists and antagonists. The fingers are ordinarily extended on the hand, and the great toe on the foot, in a posture wholly unlike that of hemiplegia. The movements cause a great output of energy, sweating and a marked rise in "basal" metabolism, unlike the tremor of paralysis agitans.

The commonest etiology for the syndrome is birth injury. In eighteen out of thirty-eight cases observed at the Neurological Unit (Boston City Hospital), there was a definite history of birth trauma, and in each case the infant was immediately noticed to be paralyzed. Athetosis also may accompany infectious and degenerative diseases and injury.

Treatment of Athetosis

Muscle Training — Actual muscle training and special exercises have been of benefit in certain cases. Exactly what principles are involved, and what cases may expect substantial relief, is by no means as clear as is the situation in regard to poliomyelitis. Improvement of strength or nutrition of muscles is seldom necessary. What is needed is relaxation, and this is difficult to teach. The methods to be employed and the qualitative results obtainable are outlined in the publications of Carlson and of Phelps. Unfortunately, no statistical analysis of a series of cases has yet been presented. Such measures are always worth trying, and if they are successful nothing more drastic need be considered, but a considerable proportion of even the willing and intelligent patients fail to obtain much benefit after years of patient effort in specialized clinics.

Drug Therapy — This form of treatment has been entirely unsuccessful in the past. Recently, West in England and Burman in the United States have reported interesting results with curare, which produces a relaxation of hemiplegic spasticity and athetoid movements lasting sometimes several days.

Operative Orthopedic Treatment — On the whole, little is accomplished for the athetoid syndrome by peripheral operations on muscles or nerves.

Of neurosurgical operations for athetosis, cortical excision may be considered in cases in which one arm alone is affected and is already useless. Section of the extrapyramidal tracts in the spinal cord is a procedure now wisely used for athetosis. It affords moderate to satisfactory relief of abnormal movements in the majority of cases.

The Effect of Fever Therapy Upon Carbohydrate Metabolism

Melvin B. Kirstein, M.D., and Leon Bromberg, M.D., St. Louis. In Laboratory and Clinical Med., 25:1:7, October 1939.

The preparation of diabetic persons for fever therapy is especially pertinent. One of the important pathologic factors in diabetes is the tendency toward an increased rate of glycogenolysis in the liver. As Somogyi has recently emphasized, if any factor which stimulates glycogenolysis (such as artificial fever) is superimposed upon this, the result may be excessive hyperglycemia, glycosuria and frequently ketosis. (This may also explain the response of persons with diabetes to infectious fevers). The vicious process can be combatted by means of adequate administration of carbohydrates and by inhibiting the rate of glycogenolysis with insulin. We feel that this concept should be applied to diabetic patients when subjected to artificial fever.

The Diagnosis and Treatment of Chronic Articular Rheumatism

Frank D. Howitt, C.V.O., M.D., F.R.C.P. In Practitioner, CXLIII:3:246, September 1939.

Primary Rheumatoid Arthritis

This disease is known as "primary polyarthritis" on the continent and as "primary atrophic arthritis" or "proliferative arthritis" in America. The view that it is the direct result of infection has now been largely discarded. On the other hand, there is increasing evidence in favor of a metabolic origin. This evidence is clinical, radiological and pathological.

Massage of the muscles is valuable, but technique is important. Muscle tissue, in cooperation with the liver and endocrine glands, plays a large part in the metabolism of carbohydrate. General massage assists this mechanism when active exercise is impossible and also rectifies the capillary stasis associated with rheumatoid arthritis. The skin surface also should be allowed access to fresh air or sunlight daily. If actinotherapy is employed, plain carbon arcs emitting a high percentage of visible rays should be employed in preference to mercury-vapor or tungsten arcs rich in short ultraviolet rays, as these have a marked excitant effect on the katabolic group of endocrine glands. The application of general heat in all forms is contraindicated as it is exhausting to the patient.

Chronic Infective Arthritis

This disease is known also as "secondary atrophic arthritis," by which is meant secondary to infection. It may follow insidiously upon the acute or subacute infective arthritis of specific infections, such as gonorrhea, or of a known septic focus which has failed to respond to treatment. In this case, the signs of acute joint inflammation gradually merge into those of atrophic arthritis.

The main indication is the prevention of the deformities which are known to take place, flexion-fixation of the knees and wrists and ulnar deviation of the fingers. The most comfortable position for the patient is not necessarily the optimum position for restoration of movement, nor of function should ankylosis occur. Common examples of this are the arm close to the side and the knee flexed over the pillow. Splinting must be intermittent and movement maintained through as great a range as possible.

Manipulative treatment must never be attempted. When firm ankylosis has taken place, the decalcified bone often will break before the joint yields. Moreover, increase of movement regained by force always is obtained at the expense of loss of strength to the disadvantage of the patient. An exception to this rule may be made in order to obtain the last 10 per cent of extension of the knee.

Osteoarthritis (Hypertrophic)

There are two main forms of osteoarthritis (hypertrophic): (1) the generalized (senile or degenerative), and (2) the monarticular (following trauma).

Treatment — It must be admitted that the treatment of senile osteoarthritis is purely palliative. The most that can be hoped for is a retardation of the degenerative process, but to this end there is no doubt that the various spa treatments are extremely valuable. The effects of such treatments are mainly two—stimulation of the skin and the application of heat. Dilatation of the skeletal blood vessels is thus produced, with consequent relaxation of muscular spasm.

Skin stimulation — It is by means of the skin that the body makes contact with its environment. A physiologically active skin is able to adapt itself to atmospheric and other climatic changes. Indeed, the maintenance of body tone is largely dependent upon such stimuli imparted through the skin to the endocrine-sympathetic system, with its control of blood distribution. It is probable that atmospheric changes normally produce vasodilator effects, as the result of liberation of a histamine-like substance in the skin (Lewis, 1927). The chronic arthritic is unable to respond to sudden changes of temperature, humidity and climate, owing to the breakdown of this mechanism. His immediate reaction is to wrap himself up in thicker clothing, thus further denying his skin its normal stimulation. Reeducation of the function of the skin, which is effected especially by hydrotherapy, is thus of considerable value in certain cases of chronic arthritis and particularly of the degenerative type.

General application of heat—This may be effected by dry heat, as in the Turkish bath, or radiant heat, in which sweating is profuse, but the body temperature is only slightly raised, owing to the cooling effect of the rapid evaporation of sweat. It must be remembered that acids are not excreted through the skin and that any increased acidity is almost en-

tirely the result of chemical changes taking place in the sweat glands due to their increased activity. Nor, indeed, is the acid-base metabolism altered in chronic rheumatism. The natural spa waters contain various ingredients but there is no evidence that these have any effect other than skin stimulation. Waters of high specific gravity, for example, brine, are, however, of value by inducing increased muscular relaxation and thus permitting passive movements to be carried out effectively.

Cold and Heat Therapy in Dentistry

Capt. C. C. Ellison, D.C., U. S. Army. In Military Surgeon, 85:3:241, September 1939.

Conclusions

1. Cold is of benefit very early in the treatment of an inflammatory process and then when the inflammation is due to trauma.
2. Cold frequently is analgesic due to its refrigerative properties.
3. Cold is not indicated in an infectious inflammatory process particularly if it has progressed beyond the abortive stage.
4. Cold applications cannot sufficiently reduce the temperature of the part to which it is applied to the stage that it will have any inhibitive action upon the bacterial growth.
5. Heat is beneficial in infectious inflammations particularly when they have progressed beyond the abortive stage.
6. Heat should be used in all cases where localization and drainage are desired.
7. Heat relieves pain in many cases due to its soothing action on the peripheral nerves.
8. Moist heat is favored by many oral surgeons.
9. A majority favor heat as a physiologic agent.

A Comparative Study of the Effect of the Interaction of Ions, Drugs and Electrical Stimulation as Indicated by Contraction of Unstriated Muscle

Inderjit Singh. In J. Physiology, 96:4:25, September 1939.

A summary of the physiology of plain muscle. Most things in plain muscle exist in pairs. Thus (1) there are two kinds of contractions, (2) there are two kinds of tone, (3) two factors control the excitability, (4) two factors are concerned in fatigue, (5) there are two kinds of adaptation or tolerance to ions, (6) there are two kinds of contraction produced by cessation of electric current, (7) there are two kinds of withdrawal contraction, (8) two factors neutralize contractures—increase of osmotic pressure and calcium, (9) during electrical stimulation two factors neutralize contractures, (10) two factors are concerned in adaptation to A. C., (11) there are two kinds of inhibition, one by ions inside and the other by ions outside, (12) ions have two effects on plain muscle—stimulating and inhibitory, (13) two factors are concerned in determining the rate of extension—visco-elasticity and tone, (14) effects of change of osmotic pressure are determined by two factors—changes in concentration of ions inside and outside the fibers.

Acute Fractures of the Neck of the Femur

Henry W. Meyerding, M.D., and George A. Pollock, F.R.C.S., Rochester, Minnesota. In Amer. J. Surg. XLVI:2:292, November 1939.

We believe in waiting until a week has elapsed following injury before surgical intervention is undertaken, even though no displacement has occurred. The advantages gained from this procedure outweigh anything that may be lost by waiting.

With accurate coaptation of the fractured ends, confirmed roentgenologically, and with the lower border of the greater trochanter exposed through a small lateral incision, a Kirschner wire is run into the femoral neck and through the head until it impinges on the acetabular wall. No trouble results from this minor trauma to the articular cartilage and a firmly fixed proximal fragment is obtained which renders the subsequent steps partially to drill the neck and head simple and accurate.

Within two weeks flexion movements at the hip by means of a knee sling are begun but later on are carried out actively. The patient is allowed up in six weeks on crutches, although weight bearing is not attempted until after the third month. Ordinarily we believe that removal of the screw in about four months prevents excessive absorption of the neck of the femur and, by removing a foreign body, militates against subsequent trouble and electrolytic reaction. In the series of cases at the Mayo Clinic in which treatment was conducted by this method, bony union occurred with excellent functional results in about 72 per cent.

Book Reviews

ANATOMY AND PHYSIOLOGY. By Frederic Theodore Jung, B.S., Ph.D., M.D., Assistant Professor of Physiology and Pharmacology, Northwestern University Medical School, Chicago; Anna Ruth Benjamin, B.A., M.D., Resident Physician, Elgin State Hospital, Elgin, Illinois, and Elizabeth Carpenter Earle, B.A., R.N., Educational Director, School of Nursing, St. Elizabeth's Hospital, U. S. Department of Interior, Washington, D. C. Cloth. Price, $3.50. Pp. 637, with 342 illustrations. Philadelphia: F. A. Davis Company, 1939.

This textbook of anatomy and physiology for nurses presents in the simplest possible terms the basic facts concerning the structure and the activities of the parts of the human body. Applications of these facts, both to the practice of nursing and to the personal life of the student, are suggested.

This book very definitely is a textbook and not a synopsis or a reference book. Study is aided by breaking down each chapter into integral topics. Each topic is first discussed completely from the anatomical, then from the physiological point of view. A preview precedes each chapter; each topic has its own preview, and at the end of each chapter will be found suggestions for laboratory and study projects. The illustrations are excellent. The book can be recommended highly as a textbook of anatomy and physiology for nurses. With supplementary lectures and the laboratory work as outlined it also can be recommended as an excellent textbook of physiology for physical therapy technicians.

CHILD GUIDANCE CLINICS: A QUARTER CENTURY OF DEVELOPMENT. By George S. Stevenson, M.D., and Geddes Smith. Cloth. Price, $1.50. Pp. 193. New York: The Commonwealth Fund, 1937.

The child guidance clinic has taken an important place in the mental hygiene movement. Throughout the country new clinics are being established each year. Those interested naturally wish to obtain significant information concerning the movement as a whole, its purposes and problems and the present accepted pattern of a successful clinic. It is the purpose of this book to supply this information. This it does quite ably.

TREATMENT IN GENERAL MEDICINE. Edited by Hobart A. Reimann, M.D., Magee Professor of Practice of Medicine and Clinical Medicine, Jefferson Medical College, Philadelphia. In Three Volumes and Desk Index. Cloth. Price, $30.00 per set. Pp. 2834, with 247 illustrations. Philadelphia: F. A. Davis Company, 1939.

The editor of these three volumes has recognized that the great mass of detail and the varied and intricate methods of therapy make it impossible for one person to pose as an authority in such widely diverse fields as, for example, endocrinology, physical therapy and gastroenterology. There are thirty-four contributors to these three volumes; each is a specialist with wide experience in his subject and is an active teacher in his field. Every subject is presented for the general practitioner and special attention is given to the newer methods of approach to disease.

Those interested in physical therapy will be pleased to note that the use of physical agents is emphasized in these volumes. The editor states: "Deplorable neglect of these methods of treatment by the medical profession has led to their employment by charlatans. Although these forms of treatment are not specific for any special disease, they unquestionably relieve symptoms, improve morale and make possible rehabilitation, all of which are indisputably within the realm of therapeutics." Of the 2834 pages in the three volumes, 576 definitely are devoted to physical therapy.

In volume three there are chapters on heat and cold in treatment; therapeutic indications for physical agents that alter tissue temperature; hyperpyrexia by physical agents; massage; manipulation; exercise; exercise in various diseases and conditions; body mechanics and posture; hydrogymnastics; occupational therapy; treatment with low frequency currents, ultraviolet radiation; the therapeutic application of ultraviolet radiation; rest in treatment and spa treatment. The chapter on hyperpyrexia is by S. L. Osborne, and the remainder of these chapters was contributed by John S. Coulter, M.D., Associate Professor of Physical Therapy at Northwestern University Medical School.

These volumes are excellent reference books for physical therapists and should be in the

library of all progressive general practitioners.

THE 1939 YEAR BOOK OF PHYSICAL THERAPY. Edited by Richard Kovacs, M.D., Clinical Professor and Director of Physical Therapy, New York Polyclinic Medical School and Hospital; Attending Physical Therapist, Manhattan State, Harlem Valley State and West Side Hospitals; Visiting Physical Therapist, New York City Department of Correction Hospitals; Consulting Physical Therapist, New York Infirmary for Women and Children, Mary Immaculate Hospital, Jamaica, N. Y., Hackensack Hospital, Hackensack, N. J. Cloth. Price, $2.50. Pp. 472, with 155 illustrations. Chicago: The Year Book Publishers, 1939.

This second "Year Book of Physical Therapy" presents in an excellent manner the progress of physical therapy within the year. Abstracts of the world literature on physical therapy are given. These are of sufficient length to present the important features of the original publication and often include the original illustrations. The first part gives the general considerations and the application of specific physical agents; part two considers applied physical therapy to various diseases. Numerous editorial comments, following the abstracted articles, add greatly to the value of the book.

This volume should be in the library of every physical therapist.

HOME CARE OF THE MENTAL PATIENT. By Dr. Arie Querido, Head of the Department of Social Psychiatry, Medical Service, City of Amsterdam. With a foreword by R. D. Gillespie, M.D., F.R.C.P., Physician for Psychological Medicine, Guy's Hospital, London. Cloth. Price, $1.00. Pp. 93. New York and London: Oxford University Press, 1936.

In a very small volume the author has tried to give the layman better insight into the nature of mental disorders. He attempts to replace fear and confusion by sympathetic understanding and advice for practical help in such cases. It is his aim to help the family deal with the difficulties which are bound to arise should any member suffer a "nervous breakdown." This book hardly can be recommended in preference to many others which are available on the same subject.

AN INTRODUCTION TO PSYCHOLOGICAL MEDICINE. By R. G. Gordon, M.D., D. Sc., F.R.C.P., Physician to Royal United Hospital, Bath; N. G. Harris, M.D., B.S., D.P.M., Physician in Charge to Woodside Hospital, London, and J. R. Rees, M.A., M.D., D.P.H., Medical Director, Institute of Medical Psychology, London. Cloth. Price, $4.00. Pp. 386. *New York and London: Oxford University Press,* 1936.

Appreciating the importance of the "mental aspects" of sickness, the authors have prepared a text for the student to equip him with information regarding the structure and function of the normal mind and its disorders. The book is divided into five sections — the first deals with psychology in relation to psychological medicine; the second with psychopathology; the third with the psychoneuroses; the fourth with the psychoses, and the fifth with mental deficiency. The material is presented in such a way as to enlighten the student with the various degrees of emotional and mental disturbances which will confront him in the practice of medicine.

This book is an excellent approach to this important branch of medical education and should be found useful by both student and practitioner.

AN INTRODUCTION TO HUMAN ANATOMY. By Clyde Marshall, M.D., Assistant Professor of Anatomy, School of Medicine, Yale University, New Haven, Conn. Second edition. Cloth. Price, $2.50. Pp. 38[illegible] with 257 illustrations. Philadelphia and London: W. B. Saunders Company, 1939.

In the second edition of this excellent textbook of elementary anatomy, the author has made surprising strides in the simplification of the subject and yet has not sacrificed fundamental principles or omitted scientific facts. The illustrations, so essential in an elementary book, are excellent.

The author has inserted footnotes to aid the student in understanding the anatomical terms, giving their derivation and meaning. Where a proper name forms part of the anatomical term, a short biographical note also is included. This volume not only presents elementary anatomy with completeness and clarity, but also shows its relations to other sciences and points out some of its everyday applications.

FEVER AND PSYCHOSES: A STUDY OF THE LITERATURE AND CURRENT OPINION ON THE EFFECTS OF FEVER ON CERTAIN PSYCHOSES AND EPILEPSY. By Gladys C. Terry, Research Associate in Neurology, Neurological Institute of New York, Columbia University; Formerly Research Assistant in Psychiatry, Henry Phipps Clinic, Johns Hopkins University. Cloth. Price, $3.00. Pp. 167. New York and London: Paul B. Hoeber, Inc., 1939.

This monograph represents a thorough and painstaking collection and correlation of all available facts regarding the effects of fever on certain psychoses. Under the heading of intercurrent natural fevers there is a careful review of the literature and a tabulation, from the literature, of 314 cases of functional psychoses and 132 cases of epilepsy. The unpublished observations of 301 investigators and clinicians in current psychiatry concerning the effects of intercurrent febrile disorders on the affective psychoses, schizophrenic psychoses and epilepsy are also given under this heading.

There is a chapter on the clinical use of artificially induced fevers in certain nervous and mental disorders with an excellent review of the physiological and various pathological reactions of this form of fever. In the chapter on therapeutic indications the author concludes that the wide divergency of expressed opinions is evidence in itself to the fact that the subject of febrile influences on the so-called functional psychoses is essentially a matter of speculation, largely determined by background and bias. "Until studies definitely establish basic facts obviously therapeutic implications are incapable of leading us to very helpful conclusions." This is a book that should be read by everyone using fever therapy.

TREATMENT BY MANIPULATION. By A. G. Timbrell Fisher, M.C., M.B., Ch.B., F.R.C.S. (Eng.), Co-trustee and Member of Executive and Research Advisory Committee of Empire Rheumatism Council; Corresponding Member of the American Academy of Orthopedic Surgeons, Orthopedic Surgeon to the St. John Clinic and Institute of Physical Medicine, London. Being the third edition of "Manipulative Surgery." Cloth. Price, $3.75. Pp. 255, with 68 illustrations. New York: Paul B. Hoeber, Inc., 1939.

This is the third edition of Fisher's book which formerly was entitled "Manipulative Surgery." It is believed that the change of title is excellent.

This monograph has been thoroughly revised. Chapters on "The Cult of Osteopathy" and "The Prevention of Adhesions" and a number of new illustrations have been added.

The author approaches the subject of manipulation from the viewpoint of the orthopedic surgeon and indicates in certain cases that open operation or other measures would yield more satisfactory results than manipulation. There is a chapter on the dangers of manipulation in unsuitable cases, and the author emphasizes his belief in the grave dangers attending manipulations performed by persons who have not received thorough training in anatomy, pathology, medicine and surgery.

The contents of this volume show that manipulative treatment is a highly specialized subject. The margin between success and failure often is a narrow one and many depend upon some point of detail, not only in the technic itself but in the after-treatment or even in the psychological approach to the patient. This volume should be in the library of those physicians interested in treatment by manipulation.

THE MECHANISM OF THOUGHT, IMAGERY AND HALLUCINATION. By Joshua Rosett, M.D., Professor of Neurology, Columbia University, Scientific Director of the Brain Research Foundation. Cloth. Price, $3.00. Pp. 289. New York: Columbia University Press, 1939.

This is a scholarly treatise attempting to summarize in a more or less philosophic way certain generalizations concerning the basis of thought, imagery and hallucinations. Although the author comments upon the physiological, chemical and electrical phenomena which are the basic reactions of the nervous system, his correlations and deductions lead him far afield from these fundamental divisions of science.

The average reader will find the material extremely difficult to understand. The well-trained neurologist or special student of the nervous system, on the other hand, may find in this book sophisticated morsels of neurologic wisdom.

BRAIN REFLEXES AND LAWS OF EXISTENCE. By William D. Hoffman. Cloth. Price, $10.00. *Pp.* 308. *Los Angeles: Parkman Press,* 1936.

The study of the nervous system as it affects the activity of various organs of the body and the behavior of the individual as a whole is admittedly a difficult and complex subject. Well-trained students of anatomy, physiology, chemistry and pathology have collaborated with the clinician in presenting a scientifically acceptable concept of nervous activity. The medical bookshelves are replete with well-recognized texts on the various phases of this subject.

The present volume is a poor attempt to simplify this material, apparently for lay consumption. It certainly does not deserve recognition among medical texts.

STEDMAN'S PRACTICAL MEDICAL DICTIONARY. By Thomas Lathrop Stedman, A.M., M.D., Editor of the Twentieth Century Practice of Medicine; of the Reference Handbook of the Medical Sciences; formerly Editor of the Medical Record, and Stanley Thomas Garber, B.S., M.D., Fourteenth edition. Cloth. Price, $7.00; *with thumb index,* $7.50. *Pp.* 1303, *with illustrations. Baltimore: Williams and Wilkins Company,* 1939.

Doctor Stedman personally edited this dictionary from 1901 until his death in 1928. The present editor, Doctor Garber, presents this new edition, retaining all the superior qualities of this dictionary. It gives plainly the pronunciation and derivation of more than 15,000 modern medical, surgical, pharmacal, dental, veterinary and other scientific terms. It can be recommended.

THE PHYSIOLOGY OF EXERCISE: A TEXTBOOK FOR STUDENTS OF PHYSICAL EDUCATION. By James Huff McCurdy, A.M., M.D., M.P.E., Research Worker (Herbert L. Pratt Research Fellowship), 1935—, *and Leonard A. Larson, B.A., B.P.E., M.Ed., Professor of Health and Physical Education in Springfield College (Corporate Title, International Young Men's Christian Association College), Springfield, Massachusetts,* 1933. *Third edition. Cloth. Price,* $3.75. *Pp.* 349, *with* 3 *illustrations. Philadelphia: Lea & Febiger,* 1939.

Doctor McCurdy is a pioneer in the field of physiology of exercise and has taught this subject for many years at Springfield College. This third edition of his book has been revised considerably. In addition the author has added two new sections both of vital interest; namely, muscular exercise for people over forty years of age and physical education for women.

In addition to his own many original contributions Doctor McCurdy has drawn upon a large and valuable bibliography for much of the material, thus making this book the outstanding work of its kind. Because it is authoritative, this book will prove invaluable to anyone interested in the physiological effects of exercise, but it should prove to be of special value to all those interested in physical education or physical therapy. Research workers should find this text especially valuable.

Part one deals with the general effects of exercise upon bodily functions; part two, effects of special types of exercise upon bodily function, and part three, methods of indicating efficiency of bodily functions. This book is highly recommended for physical education students, teachers, research workers and physical therapists.

THE TREATMENT OF RHEUMATISM IN GENERAL PRACTICE. By W. S. C. Copeman, M.A., M.D., B.Ch., Physician in Charge, Department of Chronic Rheumatic Diseases, West London Hospital, London. Third edition. Cloth. Price, $4.00. *Pp.* 276. *Baltimore: William Wood & Company,* 1939.

This presentation of the treatment of rheumatism may be considered unusual in that the book is written by a general physician who considers the clinical aspects of acute and chronic rheumatic diseases and concentrates upon the practical therapeutic methods which are available for the general practitioner.

The first two parts consider focal sepsis, acute rheumatic fever and the various forms of chronic rheumatic disease. Part three is devoted to treatment and over one hundred pages are devoted to the various physical agents used in the treatment of these conditions. This book contains a vast amount of important data and suggestions for those who are treating the chronic rheumatic diseases.

CLINICAL PSYCHOLOGY: A HANDBOOK OF CHILDREN'S BEHAVIOR PROBLEMS. By C. M. Louttit, Director, Indiana University Psychological Clinics. With a foreword by L. T. Meiks, M.D., Pediatrician in Charge, James Whitcomb Riley Hospital for Children. Cloth. Price, $3.50. *Pp.* 695, *with* 21 *illustrations. New York and London: Harper & Brothers Publishers,* 1936.

The psychologists have made many valuable contributions to medicine. This is particularly true of those psychologists who are well-trained in physiologic methods and have made studies measuring human behavior. Excellent studies in psychometrics, problems associated with intelligence and special abilities, problems relating to sleeping, sex, speech and the emotions are among the better known contributions. The present book is a comprehensive treatise covering this field and is heartily recommended.

FRACTURES. By Paul B. Magnuson, M.D., F.A.C.S., Associate Professor of Surgery, Northwestern University Medical School, Chicago. Third edition. Cloth. Price, $5.00. *Pp.* 511, *with* 317 *illustrations. Philadelphia, Montreal and London: J. B. Lippincott Company,* 1939.

The value of this volume is shown by the fact that there have been three editions in six years. This book was written for the physician who first sees a fracture, aiming to make simpler and easier his treatment of fractures and to improve his end results. All the methods described in this volume have been thoroughly tried by the author. As he states: "There are many more which are as good, there may be some that are better, but these have worked."

In this edition certain additions have been made in the discussion of first aid in the treatment of compound fractures; the pathology of the fracture lesion has been revised in accordance with the views advanced by the Fracture Committee of the American College of Surgeons. There are revised chapters on the treatment of impacted fracture of the surgical neck of the humerus, the operative treatment of fracture dislocation of the head of the humerus, the treatment of fracture of both bones of the forearm, and the section on the treatment of intracapsular fracture of the neck of the femur has been completely rewritten. Dr. J. S. Coulter has made extensive revisions in the section on physical therapy.

The problem of fracture treatment is approached from the standpoint of anatomy and physiology. Consequently the principles are so excellently presented that the surgeon is enabled to work out any minor details of treatment for individual cases.

This book can be highly recommended as presenting the fundamental principles of the treatment of fractures from first aid to rehabilitation.

NEUROEMBRYOLOGY: AN EXPERIMENTAL STUDY. By Samuel R. Detwiler, Professor of Anatomy, College of Physicians and Surgeons, Columbia University. Cloth. Price, $3.75. *Pp.* 218, *with* 107 *illustrations. New York: Macmillan Company,* 1936.

In this volume the author has grouped together his numerous contributions on experimental embryology of the nervous system and has reviewed the significant literature on this subject. Surgery on the embryo has yielded considerable information regarding neurogenesis. The growth of nervous pathways within the central nervous system and in the peripheral nerves have been studied both in vitro and in vivo and the results of these studies have been evaluated and their significance postulated. The correlation of embryologic growth with regeneration is of particular importance to the clinician as well as to the research worker and much valuable information is at hand in this book.

SLEEP AND WAKEFULNESS AS ALTERNATING PHASES IN THE CYCLE OF EXISTENCE. By Nathaniel Kleitman, Department of Physiology, The University of Chicago, Chicago. Cloth. Price, $5.00. *Pp.* 638, *with* 33 *illustrations. Chicago, Illinois: University of Chicago Press,* 1939.

This volume combines a review and critical digest of the literature on sleep written within the last twenty-five years. There is also a summary of the observational and experimental work done by the author and his associates in the past sixteen years. This work has been carried on in the laboratory of the Physiology Department of the University of Chicago where the author is associate professor of physiology.

Sleep and wakefulness are treated as alternating phases in the cycle of existence. The initial chapters are devoted to the functional differences between wakefulness and sleep. The next part deals with the course of events in a single sleep period, more properly the sleep phase of the cycle. The third division is devoted to activities extending over both phases of the cycle and exhibiting periodic or rhythmic characteristics. Artificial and spontaneous interference with the sleep-wakefulness rhythm; means of influencing the cycle through pharmacological, therapeutic and hygienic measures; states resembling sleep, hypnosis and hibernation, and an analysis of the existing theories of sleep and an elaboration of the author's evolutionary theory of sleep and wakefulness are considered in this book. It contains an excellent bibliography and is an outstanding monograph on this interesting subject.

LES SOURCES DE RAYONS ULTRAVIOLETS: LEUR UTILISATION EN PRATIQUE JOURNALIÈRE. Par Jean Saidman, foundateur de l'Institut d'actinologie. Précis d'actinologie, I. Paper. Price, 75 francs. Pp. 293, with 120 illustrations. Paris: G. Doin, 1939.

Saidman believes that actinotherapy and heliotherapy are not sufficiently appreciated by American practitioners. He thinks that this may be ascribable to a lack of standardized generators without which individual dosages of ultraviolet radiation cannot be properly prescribed. This in turn is probably the main cause for the failure to obtain the same favorable therapeutic results that have been attained in certain regions of the European continent.

In this monograph there are chapters on the physics of ultraviolet radiation, carbon arc lamp, mercury quartz lamps and other sources of ultraviolet radiation. One of the most important chapters is the one devoted to the author's method of measuring the sensitivity of the skin exposed to ultraviolet radiation. The method invented by the author in 1927 consists in irradiating a definite part of the skin with progressive intensities of ultraviolet rays controlled by an automatic device which determines the dose producing minimum erythema reactions of the first, second, third and fourth degrees. This device is known as the Saidman Sensitometer. There are excellent chapters on the choice of a lamp, the technic of irradiation and the indications for ultraviolet radiation based on this method of skin sensitometry. This book is recommended to those who are interested in ultraviolet radiation therapy.

FEVER THERAPY TECHNIQUE. By *Jack R. Ewalt, M.D., Resident Psychiatrist, Colorado Psychopathic Hospital, Denver; Ernest H. Parsons, M.D., Captain, Medical Corps, United States Army; Stafford L. Warren, M.D., Associate Professor of Medicine in charge of Division of Radiology, University of Rochester, School of Medicine, Rochester, New York, and Stafford L. Osborne, B.P.E., M.S., Associate in Physical Therapy, Northwestern University School of Medicine, Chicago. Foreword by Franklin G. Ebaugh, M.D. Cloth. Price,* $2.50. *Pp.* 161, *with* 16 *illustrations. New York and London: Paul B. Hoeber, Inc.,* 1939.

The value of fever therapy as an important adjunct in the treatment of a limited number of diseases has been definitely proven. The production of fever for therapeutic purposes is strictly a hospital procedure. In the use of physical agents for this purpose a carefully trained team of technicians and a physician is essential. This book is a practical manual of fever therapy technic for technicians and physicians.

There are chapters on the principles of fever therapy, methods of inducing fever, the radiant energy technic of administering artificial fever; technic of artificial fever therapy administered with the hypertherm; technic of artificial fever therapy administered with high frequency currents; malaria; intravenous typhoid vaccine; complications and methods of control; therapeutic dosage, and the present status of fever therapy. It can be recommended to those using fever therapy.

BOOKS RECEIVED

THE COMPLETE GUIDE TO BUST CULTURE. By A. F. Niemoeller, A.B., M.A., B.S. With a foreword by Edward Podolsky, M.D. Cloth. Price, $3.50. *Pp.* 160. *New York: Harvest House,* 1939.

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